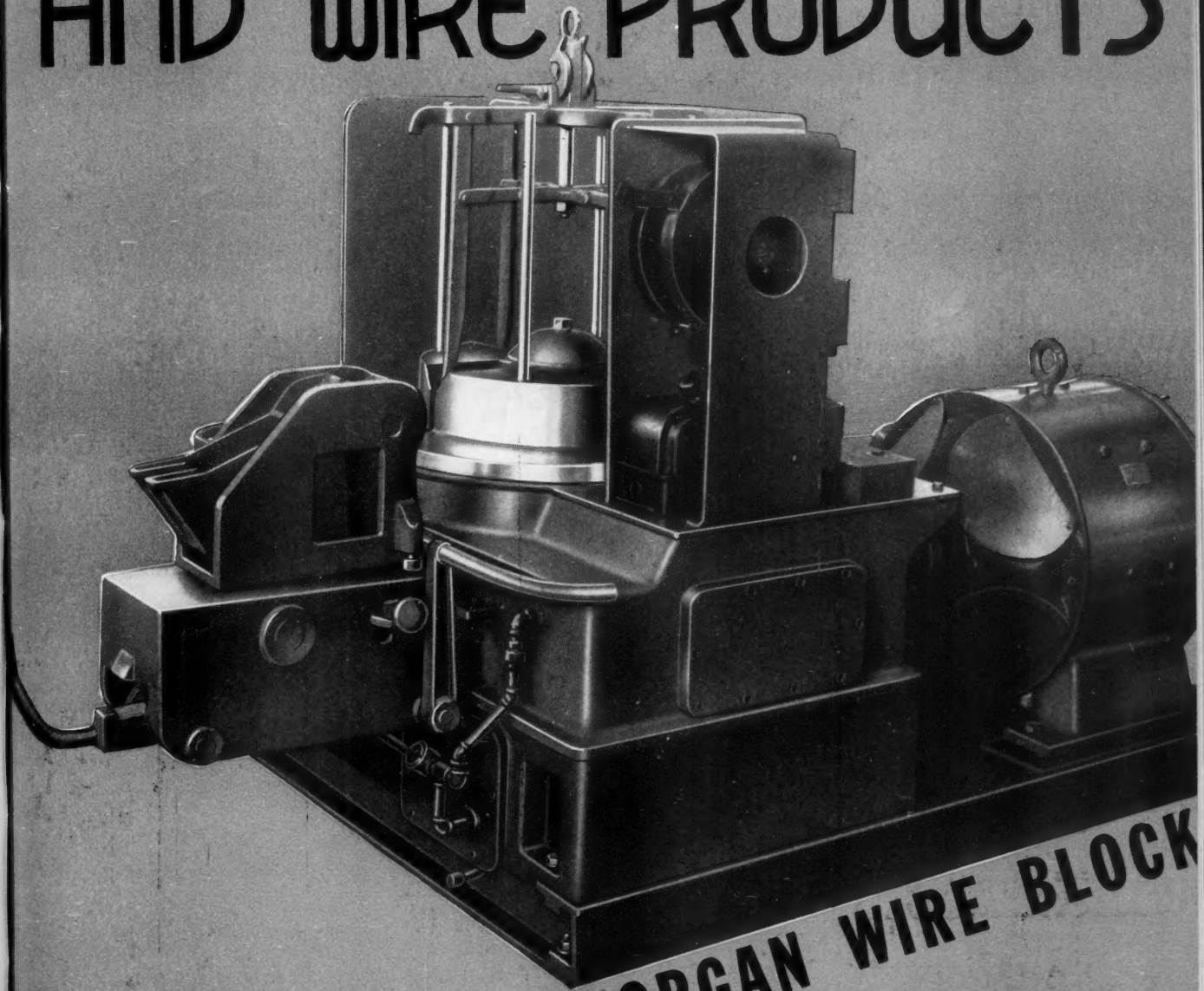
WIRE AND WIRE PRODUCTS

DECEMBER, 1945

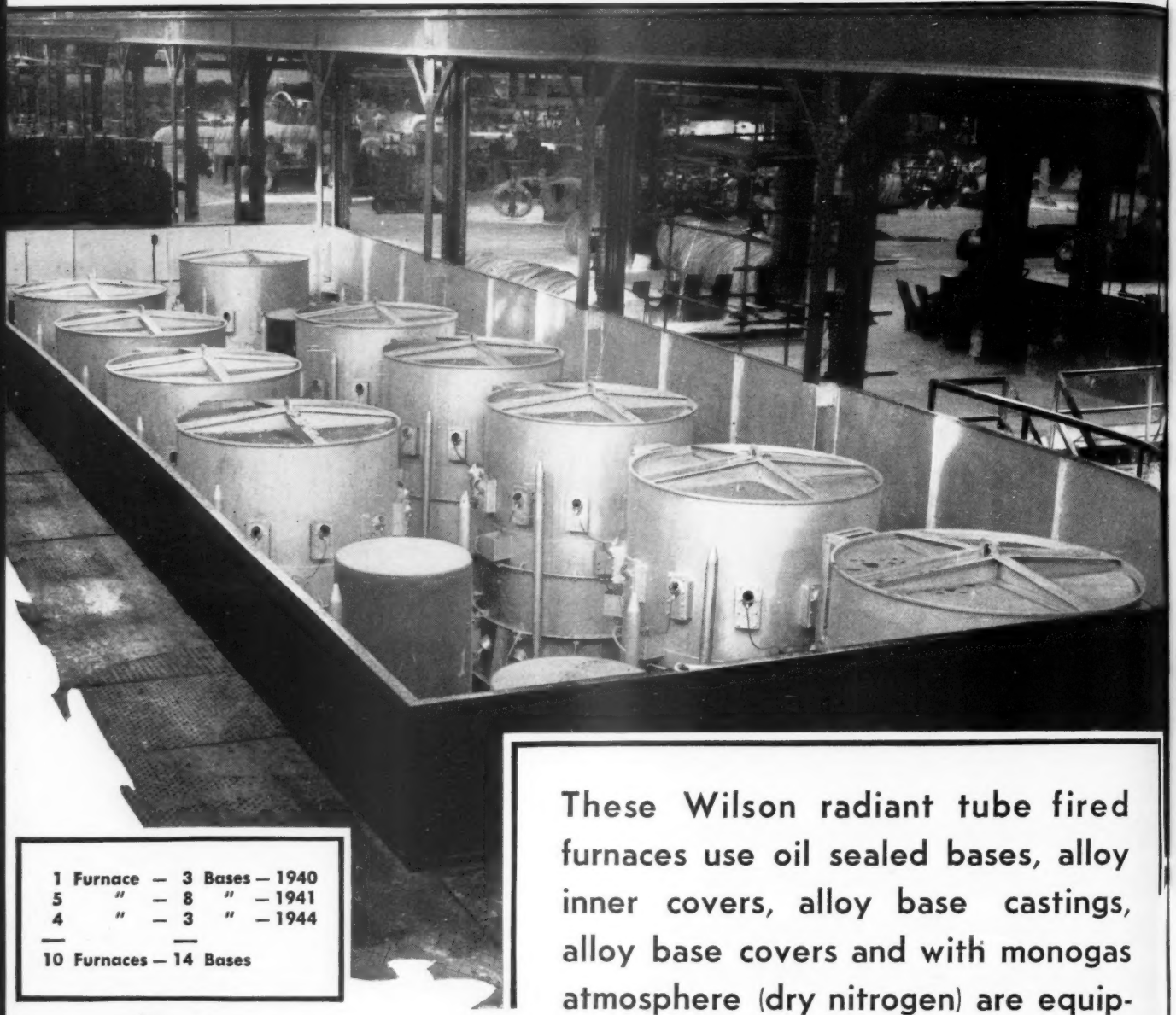


MORGAN WIRE BLOCK

MORGAN CONSTRUCTION COMPANY • WORCESTER, MASS.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

EN WILSON CYLINDRICAL BELL TYPE *Furnaces* SERVE THIS LARGE PRODUCER OF ROD & WIRE COILS...



1	Furnace	3 Bases	1940
5	"	8 "	1941
4	"	3 "	1944
10	Furnaces	14 Bases	

These Wilson radiant tube fired furnaces use oil sealed bases, alloy inner covers, alloy base castings, alloy base covers and with monogas atmosphere (dry nitrogen) are equipped for spheroidizing all analyses of alloy and high carbon rod and wire coils.

The Wilson Annealing Unit is covered by Patents Nos. 1,952,402, 2,068,477, 2,078,356, 2,081,612, 2,089,843, and other patents pending.

ENGINEERED AND CONSTRUCTED BY THE

Lee Wilson ENGINEERING Co., Inc.

20005 West Lake Road CLEVELAND, OHIO

Telephone ACademy 4670

INDUSTRIAL FURNACES ★ RADIANT TUBE HEATING ★ HEAT TREATING PROCESSES

WHETHER THE JOB IS . . .

WIRE DRAWING
BAR DRAWING
TUBE DRAWING

CARBOLOY (TRADEMARK) CEMENTED CARBIDES MEANS QUALITY!

From raw material processing to final finishing operations, the quality of every Carboloy Cemented Carbide die nib is guarded by exacting material control, precision workmanship and step-by-step inspection.

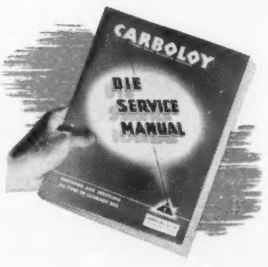
There's extra quality . . . . extra values, not only in the nib itself, but also in the casing process. Nibs are shrink-fitted or forged into specially selected casing steels for closest casing-to-nib contact . . . held in compression to give extra security against radial or lamination cracks.

The result of 16 years specialization in the manufacture of carbides, every Carboloy die has these and many other extra-quality values. But Carboloy values don't stop there! To help you get top performance from every die, Carboloy also provides this comprehensive 3-way technical service:

1. "ON-THE-SPOT" help from Field Service Men on all your carbide die problems.
2. The Carboloy Die Training School at Detroit, to train your key men in die finishing and maintenance.
3. A Die Service Manual, WRITTEN BY THE MEN WHO MAKE THE DIES, with complete facts on every phase of Carboloy die finishing and servicing.

FOR TOP QUALITY AND PERFORMANCE IT PAYS TO SPECIFY "CARBOLOY"

NEW! 64-page Die Service Manual D-119. An up-to-the-minute manual on dies, die applications and maintenance.
WRITE FOR YOUR COPY!



CARBOLOY
(TRADEMARK) CEMENTED CARBIDES

COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

CARBOLOY COMPANY, INC., 11171 E. 8 Mile Road, Detroit, 32, Michigan

Chicago • Cleveland • Detroit • Houston • Los Angeles • Milwaukee • Newark • Philadelphia • Pittsburgh • Thomaston, Conn.

Authorized Distributors: Hartley Wire Die Co., Thomaston, Conn. • Michigan Wire Die Co., Detroit, Michigan

Of the many little devices in everyday use that save time and make life more convenient, it's surprising how many are made of wire, or depend on wire in some way.

Perhaps you're planning to bring out some new gadget for household or outdoor use that will be made of wire. It may be a simple little item for the dime-store trade, or something more elaborate. Whatever it is, if it calls for wire, Bethlehem's complete line of manufacturers' wire is pretty certain to include wire of the kind and size you are going to need.

Bethlehem wire is top-quality wire in every respect. It is accurately made from superior grades of steel, and is available in a complete range of sizes, tempers and finishes. Why not investigate Bethlehem wire today? Details are readily available from the nearest Bethlehem district office, or from Bethlehem Steel Company, Bethlehem, Pa.

★ BETHLEHEM STEEL

★ **BETHLEHEM WIRE** ★

Bethlehem Steel Company, General Offices: Bethlehem, Pa. Bethlehem Steel Export Corporation, New York City

For Every Spring Grinding Job . . .

NORTON DISCS

Engineered to the job — that's the reason for the success of Norton Disc Wheels in increasing spring grinding production. And they can be expertly engineered because of these Norton facilities:

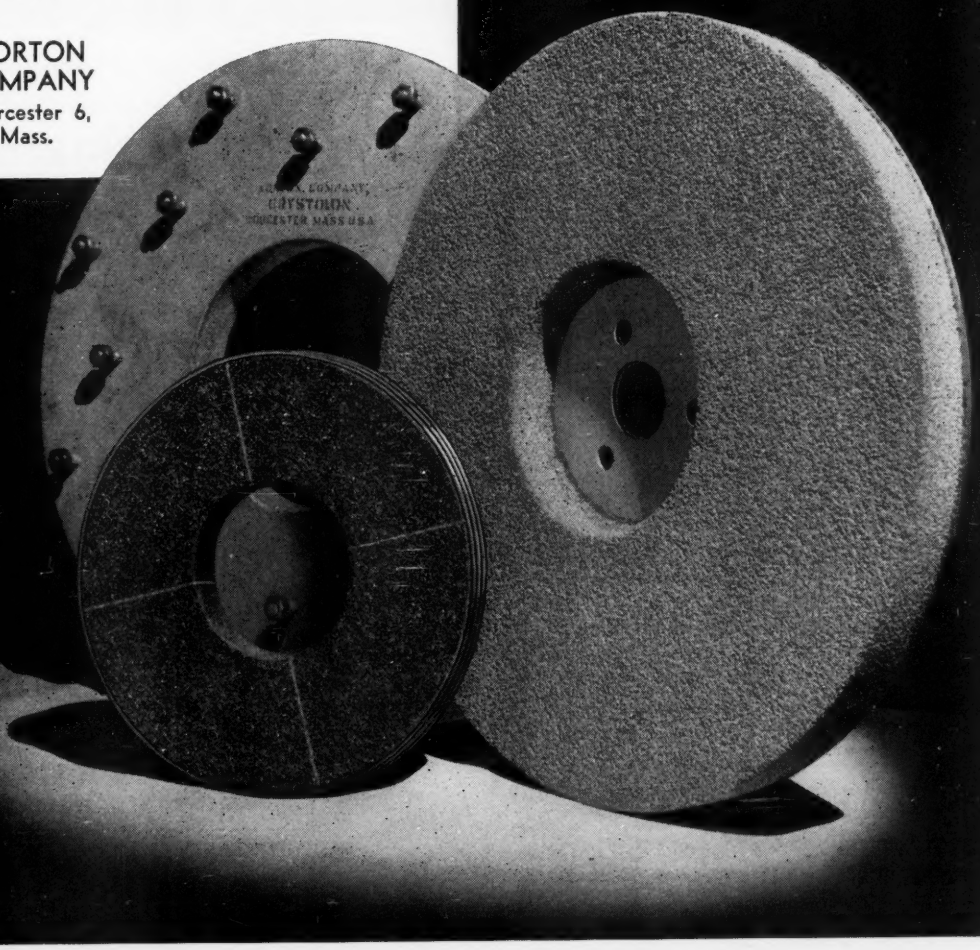
1. Resinoid, silicate and vitrified bonds — whichever your particular job requires.
2. The patented Controlled Structure process of manufacture that assures uniformity throughout each disc and from disc to disc.
3. Segmental and solid type discs with mountings to fit all sizes and kinds of grinders.
4. Experienced engineers the country over to give expert help on disc wheel selection.

It will pay you to use Norton Discs on your spring grinding jobs.

NORTON COMPANY
Worcester 6, Mass.

W-974

NORTON ABRASIVES



MAGNUS METAL COAT No. 267

...FIRST to ELIMINATE LIME in Production Drawing of Wire

MAGNUS METAL COAT No. 267 has been in production use by many wire mills for more than three years. It entirely eliminates the baking operation. Hydrogen embrittlement is prevented right in the solution.

A far better finished wire is obtained, particularly on bright wire, wire for metallic coatings or other subsequent finishes, welding wire, rope wire, tire bead wire, etc. Rejects due to scratching or off size are virtually ended. Magnus Metal Coat No. 267 also definitely improves die life, especially on high speeds on continuous machines. The cost of lubricant is reduced by as much as 50% in many cases.

Its rust-preventing action is superior to that obtained by any other treatment. It deserves careful consideration on this count alone.

Of course Magnus Metal Coat No. 267 costs considerably more than lime, but where it is used the ultimate cost per ton of wire drawn and finished is far below that of wire drawn with lime. Nor should the fact be overlooked that in any mill using this unique product, machines and surroundings are kept clean, with consequent improvement in working conditions and production results.

If you are interested in this outstanding improvement in wire drawing, write us for complete details.

MAGNUS

MAGNUS CHEMICAL CO., 188 SOUTH AVE., GARWOOD, N. J.

Wire Drawing Compounds

We are sometimes asked what is the secret of the materially increased production, improved quality and lower unit cost resulting wherever F.E.I. direct fired furnaces are installed.

No one feature accounts for it all—it's a combination of engineering skill, combustion know-how, new principles, and careful manufacture. These, taken together, make up the F.E.I. direct fired system —a system showing tangible and profitable advantages in every installation made to date.

Call on F. E. I. engineers to help you meet changing production schedules by reconversion of your old, or installation of new equipment. Write today.

Direct Fired Cover Annealing Furnaces, for coiled strip, tin plate, flat sheets, wire and rod.

Spheroidizing, Normalizing and Bright Annealing Furnaces.

Galvanizing, Patenting, Lead Annealing and Salt Bath furnaces for the wire industry.

Galvanizing Furnaces for pipe, sheets and job shops.

Conversion of any existing Cover Annealing Furnace to F. E. I. direct fired system.

FURNACE ENGINEERS, *Inc.*

Specializing in the design, manufacture and installation of furnaces for the metal working industries

1551 WEST LIBERTY AVENUE ★ PITTSBURGH, PA.

Copper Coat with CUPRODINE

FOR STAINLESS AS WELL AS CARBON STEELS

The wide use of Cuprodine, in the wire industry, proves its superiority over acid copper solutions. The tighter and more dense Cuprodine coatings improve drawing properties and save dies.

New grades of Cuprodine have been developed that produce better copper coatings on nickel chrome steels so that these as well as the carbon steels can be coated with Copper by a simple immersion process.

Cuprotek — It is generally recognized that copper coatings cannot be relied upon to prevent rust on steel. The protective effect, however, of copper or copper-tin coatings can be greatly improved by treating them with Cuprotek. Both the Cuprodine and Cuprotek processes are simple and effective.

Further information and the assistance of our Technical Service Department are available to adapt our products to your requirements. Address Dept. *D-11.*

MANUFACTURERS OF INHIBITORS AND METAL WORKING CHEMICALS

AMERICAN CHEMICAL PAINT CO.

ACP

AMBLER PENNA.

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3665 Palmer Ave., Detroit, Mich.

Canadian Office and Factory
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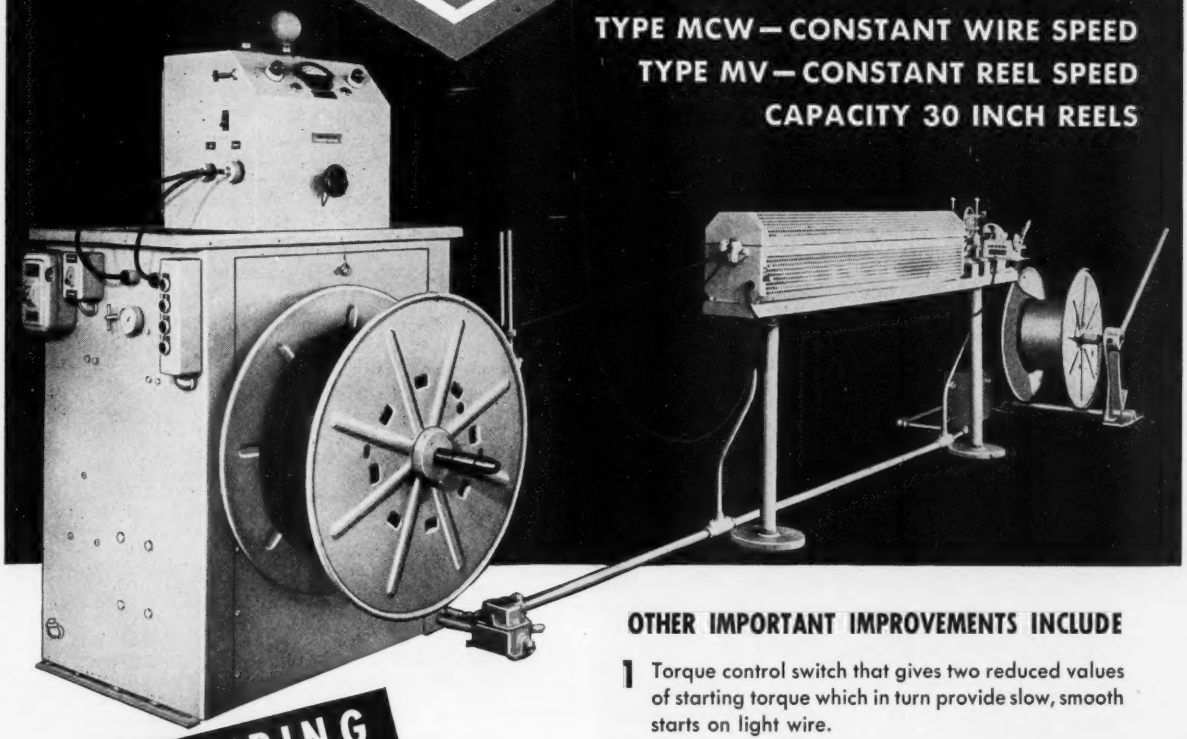
THE NEW JLE AUTOMATIC REELER

TYPE MCW — CONSTANT WIRE SPEED
TYPE MV — CONSTANT REEL SPEED
CAPACITY 30 INCH REELS



FEATURING

JLE **TYPE MCW** — Constant Wire Speed variable from 650 to 1950 F.P.M. can be maintained over the full range of reel build-up.

JLE **TYPE MV** — Constant Reel Speed variable from 100 to 300 R.P.M.

JLE **ALL TYPES** — V-Belt Drive throughout, eliminating gears in main drive.

JLE Traverse Variable for wire size and width of reel.

JLE Air Brakes on main (reel) shaft. No braking done through belts or gears.

OTHER IMPORTANT IMPROVEMENTS INCLUDE

1 Torque control switch that gives two reduced values of starting torque which in turn provide slow, smooth starts on light wire.

2 Air Brakes on Reeler and also on Pay-Off Reel Stand give smooth stops without strain on wire. Brakes are easily adjustable and are provided with a gauge permitting predetermined values to be readily duplicated.

3 Traverse is instantly and infinitely variable to handle wire .1 to .7 inches in diameter.

Both coarse and fine adjustments are provided for various reel widths. Traverse reset button allows traverse bar to be moved to start wire at side of reel. Traverse cannot jam due to over-travel.

The new JLE Automatic Reelers form a part of the complete JLE sets of Automatic Spark-Testing, Measuring and Reeling equipment for testing or locating insulation faults for repairs.

JAMES L. ENTWISTLE CO.

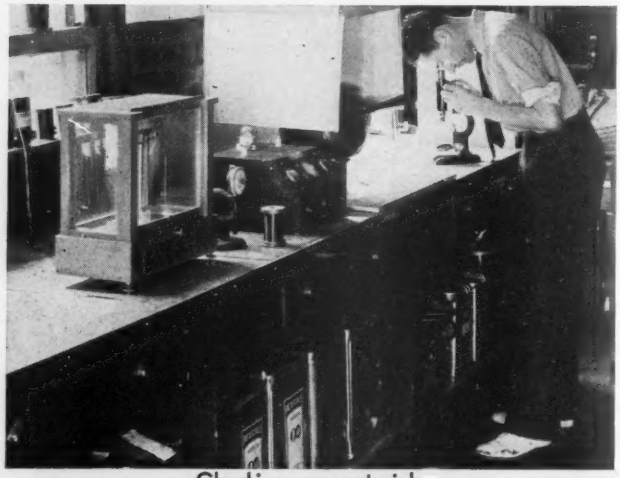
43 CHURCH ST., PAWTUCKET, R. I.

WORLD'S LEADING MANUFACTURER OF SPARK-TESTING EQUIPMENT

WIRE & WIRE PRODUCTS, Vol. 20, No. 12, December, 1945. Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S. Spengel, Sec. and Treas. Publication office, 206 Summer St., Stamford, Conn. Subscription price: U. S., $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign, $7.50 per year. Entered as second class mail at the Post Office, Stamford, Conn., Feb. 9, 1945, under Act of March, 1879.

Custom built spools for high speed winding

Mercury testing for continuity of film



Checking raw materials

Don't "fool around"... USE DEPENDABLE WIRE PRODUCTS!

A product, too, is only as strong as its weakest part. Follow the practice of leading designers and engineers by specifying only service-giving wire . . . wire that has built up a reputation for "delivering the goods under fire."

Hudson Wire products, designed for discriminating manufacturers, has just such a reputation in the fine wire field. Offering greater flexibility and tensile strength, perfect laying at higher speeds, new coating methods and reduced coil dimensions without sacrificing electrical values, Hudson Wire products will probably lower your production costs considerably. Check these three points:

QUALITY – All phases of manufacture, from ingot to final processing, are carefully supervised and fulfilled in the same manner you would carry out in your own plant. There are no unimportant phases in the work.

UNIFORMITY – By mercury process tests, our engineers can guarantee perfect uniformity in wire; from the smallest to the largest order. No more variations in consistency, structure or electrical properties . . . every inch of wire exactly as specified, more than meeting your requirements.

SERVICE – If you have a wire problem, our complete design and engineering facilities are at your disposal without obligation. Send your specifications and blueprints for our recommendations; or if you are not quite ready, write for samples of these quality products.

Enameled Copper, Enameled Iron, Enameled Alloy, Enameled Aluminum, Silk Covered, Cotton Covered, Celanese Covered, Glass Fibre Covered, Twisted Multiples, Parallel Multiples, and Litzendraht.

HUDSON WIRE CO.

Winsted Division

WINSTED CONNECTICUT

We speak our piece about PEACE

Because a few months have passed since the wonderful news about peace, there are some who think American industry should be back in full time civilian production.

Cheney Brothers heartily wish this were true.

But peace has its headaches, and they are not the kind induced by too much Victory celebration, either.

For example, while the Cheney Mills are geared to turn out much needed yarns for civilian consumption at tremendous wartime volumes, many fibers are still on the restriction lists. This, in many cases, is not alone retarding production of regular run-of-the-mill items, but is also holding up release of many new yarns of which Cheney is particularly proud—yarns with amazing characteristics and which are the result of Cheney wartime research and development.

However, as fiber restrictions are lifted, these new items will be brought to you as quickly as possible. In the meantime we will make every effort to fill your needs with whatever is available when and how we can. And as every item you do get will carry the Cheney name—you will have, as always, the assurance of its unqualified quality and workmanship.

THE WAR BONDS YOU BOUGHT YESTERDAY . . .
THE VICTORY BONDS YOU BUY TODAY . . .
HOLD 'EM ALL FOR THEIR FULL VALUE TOMORROW!

CHENEY YARNS

CHENEY BROTHERS
Quality manufacturers since 1838
350 FIFTH AVENUE, NEW YORK 1, N. Y.
Velvets—Pile Fabrics—Cravats—Upholstery and Decorative Fabrics
Yarns for Industry—Men's Wear Fabrics—Machine Thread—Industrial Fabrics
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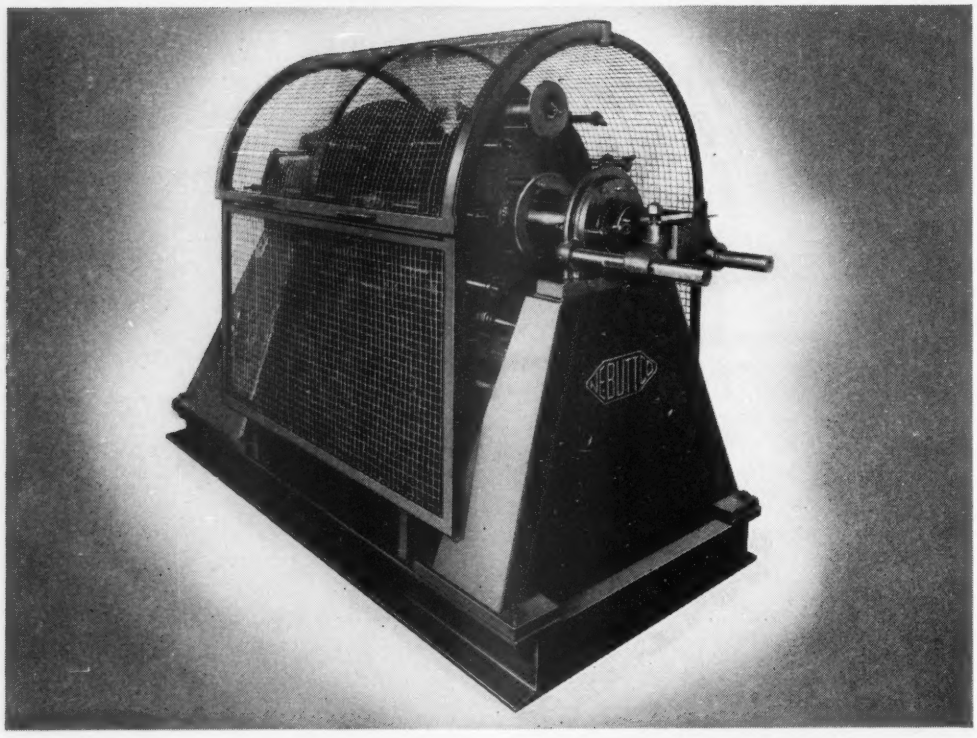
MILLS AT MANCHESTER, CONN.

ALSO AT MANCHESTER, CONNECTICUT, A SUBSIDIARY...PIONEER PARACHUTE COMPANY

WIRE WRAPPING MACHINES



Wire heads as illustrated are used for wrapping wires around two or more insulated conductors to form a neutral ground, as in service entrance cable.

The same unit with slight modifications may be used as a jute serving head.

The head is designed to carry 42 spools of 25 pounds capacity each.

The unit is of sturdy construction and is equipped with an electrically operated brake and electronic stop motion.

This machine is suitable for use in line with your present taping heads or compound tanks.

Write for details.

NEW ENGLAND BUTT COMPANY

ESTABLISHED 1842

304 PEARL STREET
PROVIDENCE 7, RHODE ISLAND, U. S. A.

James Day (Machinery) Ltd., "Ford House," 88 Regent St., London., W.I., England

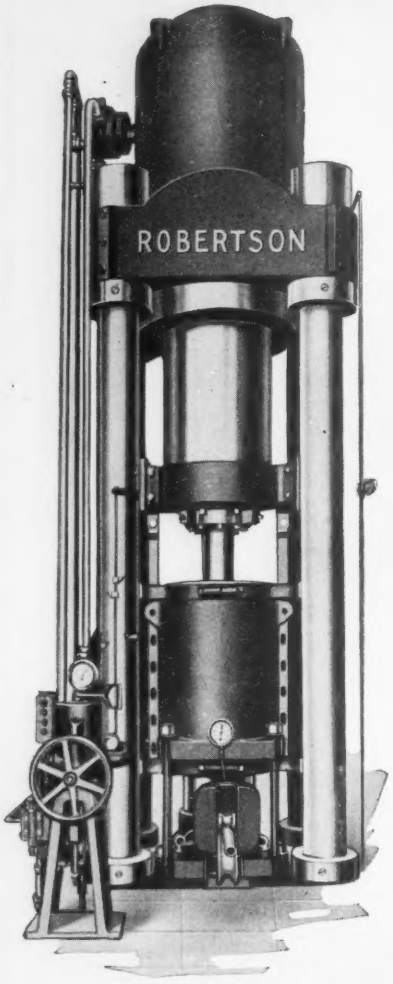
The Season's Greetings

Standardize with Standard

STANDARD INDUSTRIAL COMPOUNDS COMPANY

4600 W. Ferdinand Street, Chicago 44, Ill.

Standardize with Standard



Hydraulically Speaking.....

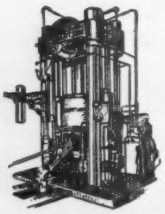
Robertson hydraulic equipment is designed and constructed with the backing of over 87 years' experience. In that time, we have built *only* hydraulic machinery . . . and the skill and "know-how" acquired through this specialized experience produces the fine quality for which Robertson Equipment has become world-renowned.

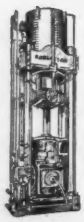
We are designers and builders of all types of lead encasing machinery for rubber hose and electrical cable manufacturers, including Extrusion Presses, Hydraulic Pumps, Melting Furnaces and Pots, Dies and Cores, Hydro-pneumatic Accumulators and Lead Sheath Stripping Machines.

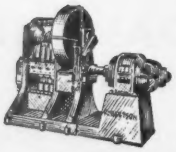
JOHN Robertson
COMPANY INCORPORATED

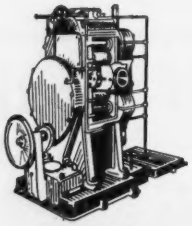
125-135 WATER STREET, BROOKLYN 1, NEW YORK
Designers and Builders of all Types of Lead Encasing Machinery
Since 1858

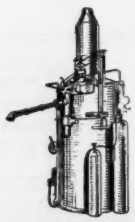
HYDRO-PNEUMATIC ACCUMULATER

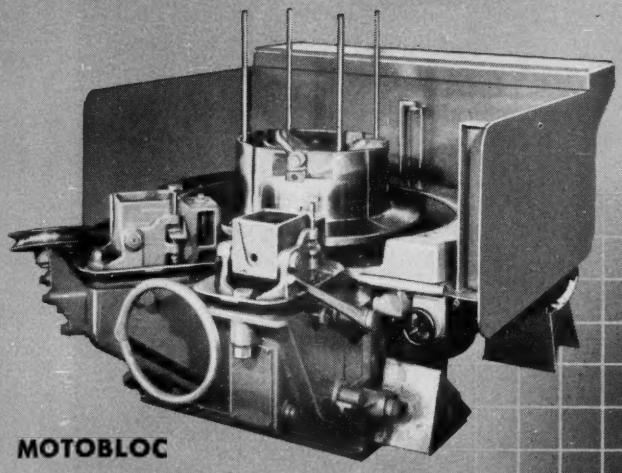

HOSE LEAD ENCASING PRESS


CABLE LEAD ENCASING PRESS


HIGH PRESSURE HYDRAULIC PUMP


LEAD SHEATH STRIPPING MACHINE


CLOSED LEAD MELTING POT



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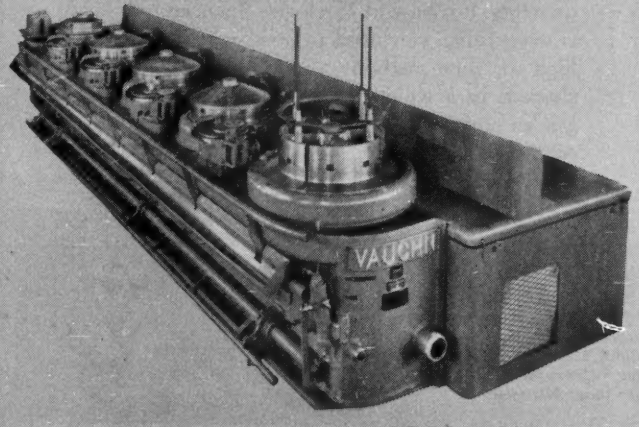
GREATER PRODUCTIVITY

—BY THE HOUR

—BY THE YEAR!

Vaughn WIRE DRAWING MACHINERY



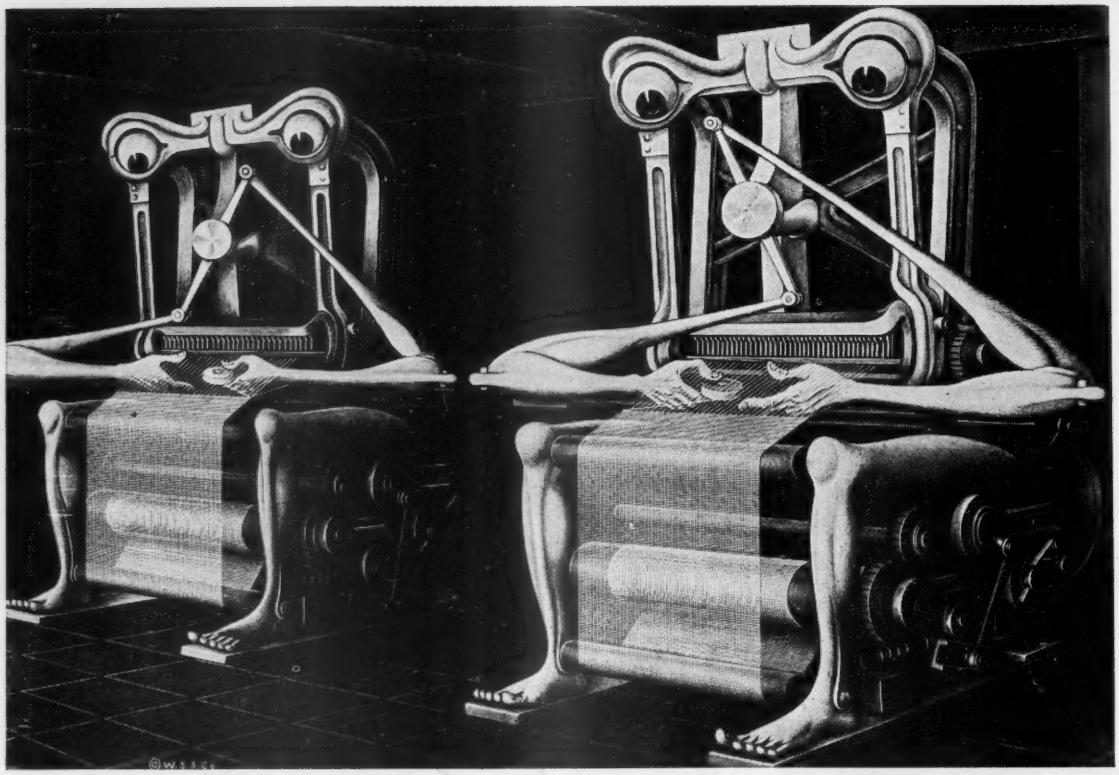
MOTOBLOX

Measure your wire drawing needs—you'll find that Vaughn Machinery measures up to them! For consistent, fast, versatile, dependable wire production, on a cost basis that enables you to compete effectively in your chosen markets—*standardize on VAUGHN.*

THE VAUGHN MACHINERY CO.

CUYAHOGA FALLS, OHIO

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Hole . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.



Eleventh of a series of Artzybasheff's impressions of the manufacture of steel wire products. *Enlarged reproduction free on request.*

CATERING TO SCREEN STARS

If you use bar, fly shuttle, or crimp looms, you know that these "screen stars" can be as temperamental as those on movie lots. You must cater to them if you want their production to rate four stars.

Weaving top quality wire cloth requires careful adjustment of looms, skilled craftsmanship *and wire that's uniform* in size, tensile and stiffness. With the demand for wire screening as heavy as it is, you can't afford to have broken wires slow up production and ruin a run of wire cloth.

You can avoid trouble by using Wickwire Spencer Wire. Our confidence in making this statement is based upon 124 years of experience in the making and working of wire . . . upon complete control of every step of manufacture from ore to finished product . . . and upon repeat orders from a long list of satisfied customers.

Whether you need a strong, tough, hard drawn or tempered wire, or a soft, ductile wire that will stand severe forming, you'll find it at Wire Headquarters. For here at Wickwire Spencer is everything you need in steel wire—high or low carbon; round, flat or shaped; in a wide variety of tempers, grades and finishes. Let us know your requirements.

Send your wire questions to

WICKWIRE SPENCER Steel

A DIVISION OF THE COLORADO FUEL AND IRON CORPORATION
EXECUTIVE OFFICES—500 FIFTH AVENUE, NEW YORK 18, N. Y.
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Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

A CRANE PER BLOCK . . .

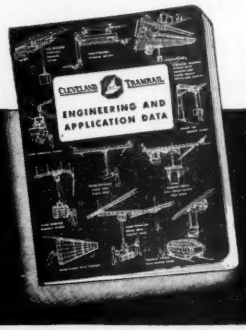
SPEEDS ROD PRODUCTION AT ATLAS STEELS LIMITED

No time is lost in the stripping of rod from the drawing blocks at the Atlas Steels Limited, Welland, Ontario. Each block is provided with its individual crane so that the operator can strip the block immediately at the end of the run without delay.

Having ample crane service is especially important because much of the rod is run through in small lots and requires handling every few minutes. Since the rod is of high grade alloy steel that is vitally needed for the war effort, it is essential that the blocks be in operation every possible moment.

The cranes not only speed production but bring about sizeable savings that pay for the cranes in a short time. Hernia injuries from heavy liftings are eliminated.

Cleveland Tramrail block-stripping cranes and carriers are serving many rod and wire-drawing plants with both internally and externally-stripped blocks.



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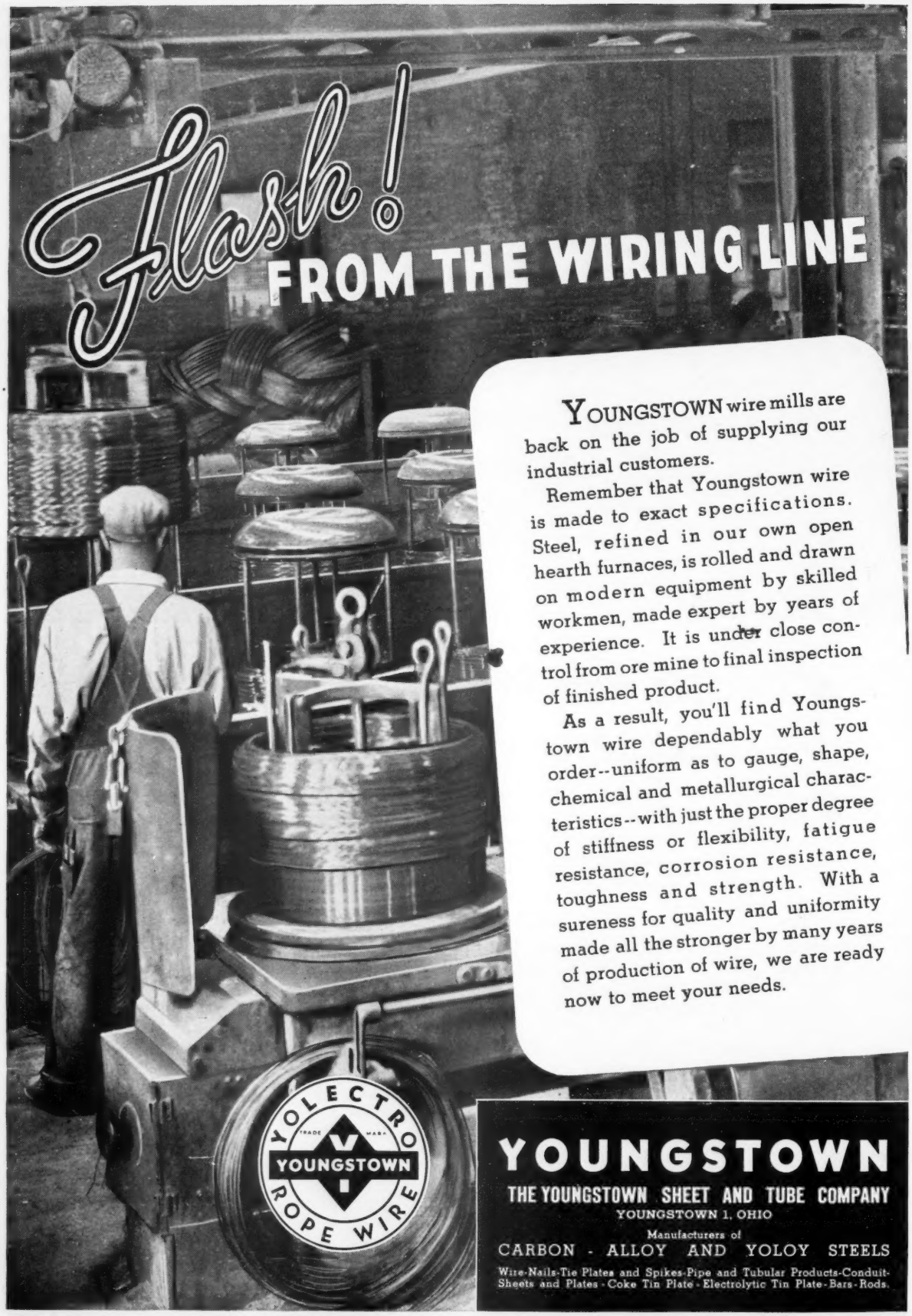
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1183 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT


Flash!
FROM THE WIRING LINE
YOUNGSTOWN wire mills are back on the job of supplying our industrial customers.
Remember that Youngstown wire is made to exact specifications. Steel, refined in our own open hearth furnaces, is rolled and drawn on modern equipment by skilled workmen, made expert by years of experience. It is under close control from ore mine to final inspection of finished product.
As a result, you'll find Youngstown wire dependably what you order--uniform as to gauge, shape, chemical and metallurgical characteristics--with just the proper degree of stiffness or flexibility, fatigue resistance, corrosion resistance, toughness and strength. With a sureness for quality and uniformity made all the stronger by many years of production of wire, we are ready now to meet your needs.
YOLECTRO
YOUNGSTOWN
ROPE WIRE
YOUNGSTOWN
THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN 1, OHIO
Manufacturers of
CARBON - ALLOY AND YOLOY STEELS
Wire-Nails-Tie Plates and Spikes-Pipe and Tubular Products-Conduit-Sheets and Plates - Coke Tin Plate - Electrolytic Tin Plate - Bars - Rods.

Insulated with
Du Pont POLYTHENE
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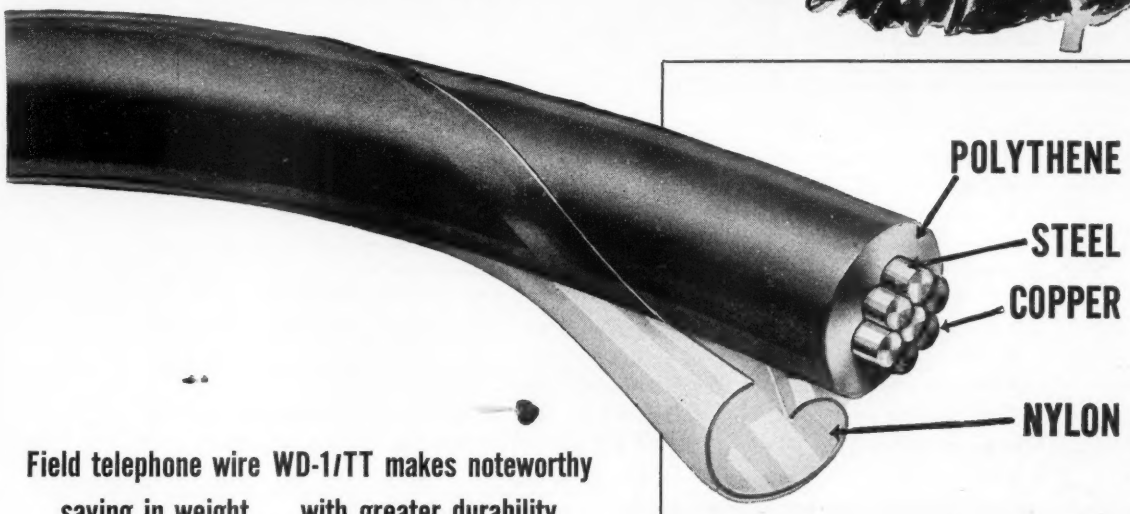

Section of Field Wire WD-1/TT, magnified approximately 12 times. Wall thickness of polythene insulation; 18 mils. Wall thickness of nylon jacket; 5-6 mils. Overall diameter; 80-82 mils. Average weight per mile: 48 lbs.

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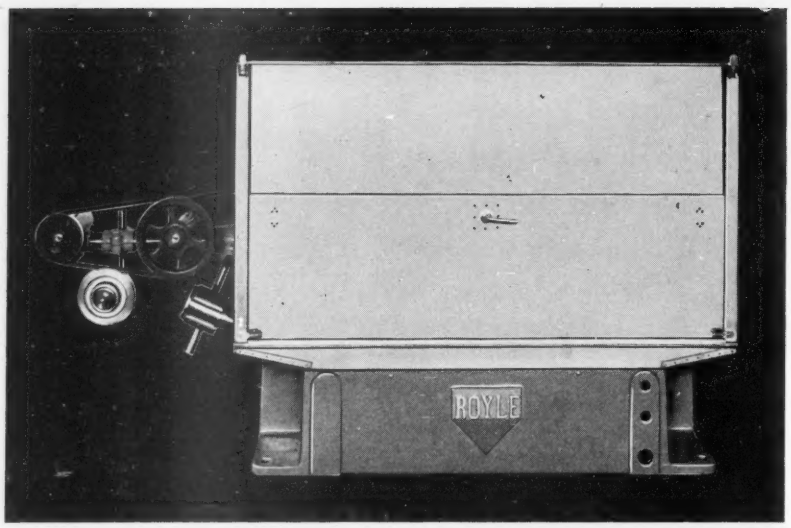

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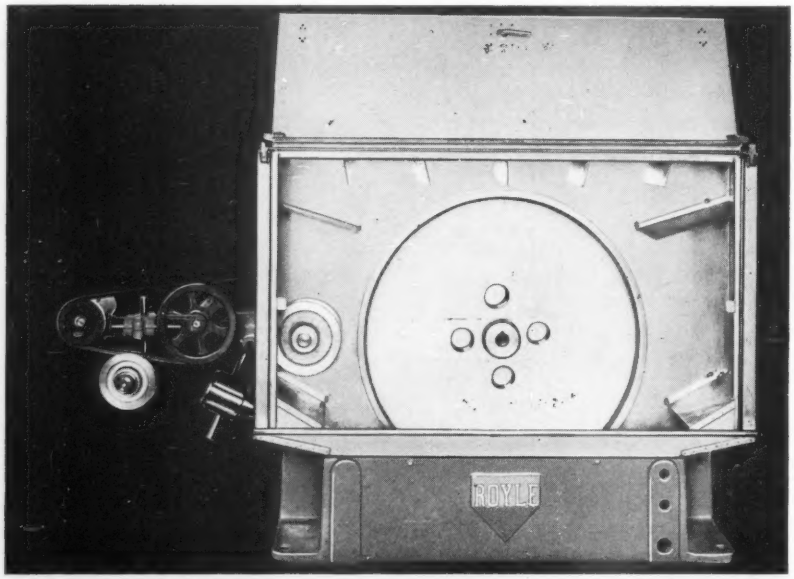

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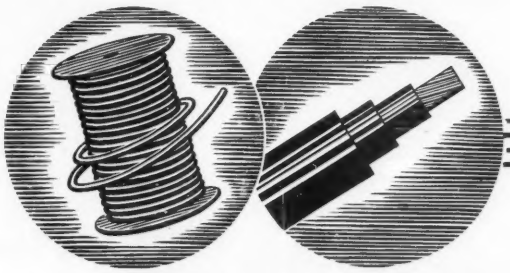

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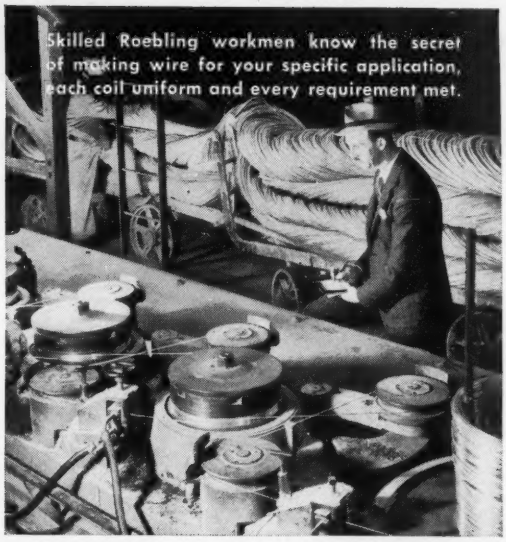
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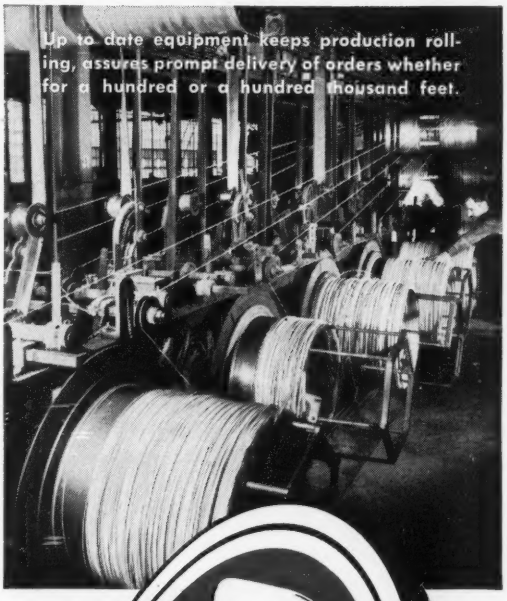
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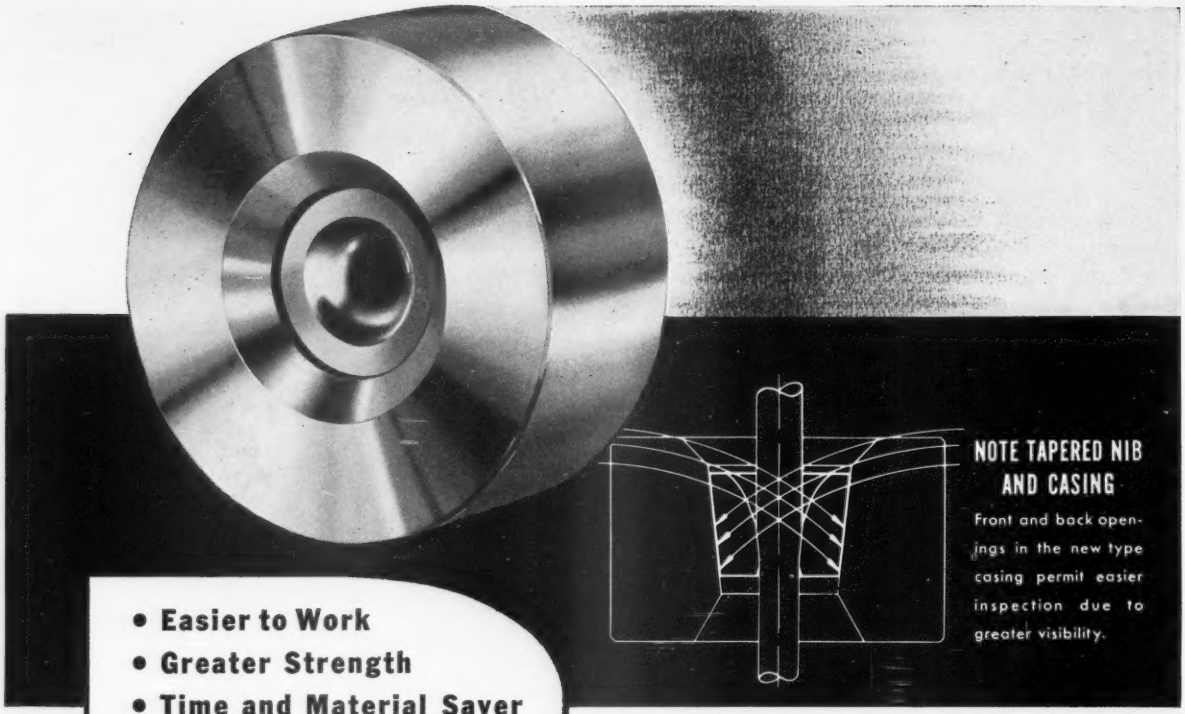
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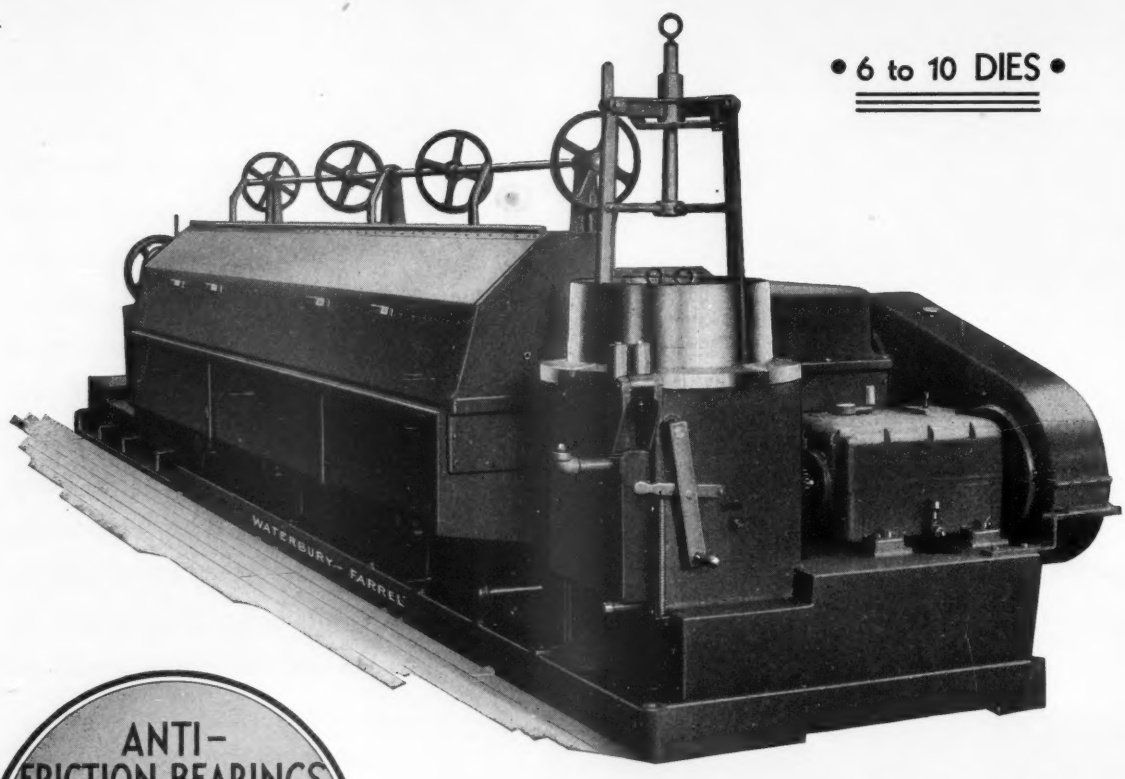

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A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 DECEMBER, 1945 No. 12

Designated as

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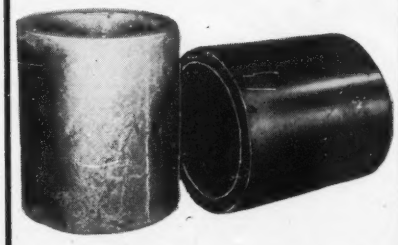

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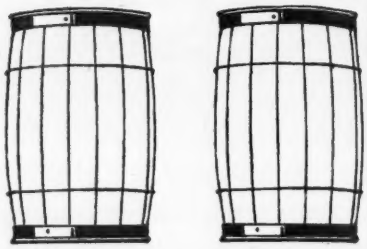

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 DECEMBER, 1945 No. 12

The Importance Of Reduction Of Area In The Evaluation Of High Carbon Steel Wire For Cold Drawing Purposes

By

D. A. Sutch, Metallurgist, and B. L. McCarthy, Chf. Metallurgist,

Wickwire Spencer Steel Co., Buffalo, New York

A paper presented at the Wire Association Annual Convention, Chicago, Illinois, in October, 1945.

FOR many years we have all realized the patenting operation is perhaps the most essential part of the processing of high carbon wire for Rope Wire, Spring Wire, and other high carbon steel wire items used in the cold drawn condition.

✦ ✦ ✦

THE essential features of good heat treating practices common to the general heat treatment of steel apply in the patenting process in the same manner as any other important heat treating problem. These essential features are primarily—

1. **Complete solution of inter-metallic compounds.**
2. **The development of a uniform austenite.**
3. **Controlled precipitation of the carbides.**

✦ ✦ ✦

BECAUSE of the nature of the patenting process, and the economic features which must be considered in the manufacture of steel wire, it is only logical that we should seek some simplified test procedure which would serve as a ready indication of the acceptability of the material for the purpose intended, as well as an evaluation of the material as regards the three requirements stated above.

✦ ✦ ✦

EXPERIENCE has shown that the use of the reduction of area value as determined on the necked down area of the broken tensile specimen supplies this means of evaluation. This is based on the following principle:

✦ ✦ ✦

THAT within reasonable limits, and with due consideration to the amount of carbon in the material, the reduction of area value can be used as a direct indication of the austenitic grain size resulting from the patenting treatment. That the austenitic grain size thus indicated is in itself a means of indicating the presence of complete solution of the inter-metallic compounds because in the absence of complete solution, the austenitic grain will not grow to any definite size. Also, that the presence of a certain austenitic grain size can be used as direct indication of the type of precipitation of the carbides. This is based on the fact that a direct relationship exists between the austenitic grain size and the reaction rate.

✦ ✦ ✦

FIRST I think we should describe this reaction rate. When steel is heated to above its critical, and complete solution of the austenite obtained, the characteristics of the precipitated constituents are influenced, first, by the rate of cooling, and with the rate of cooling being constant, then by the austenite grain size. The term reaction rate is used to indicate the rate at which the transformation from austenite to a ferrite and iron carbide takes place.

✦ ✦ ✦

IF we have a fast reaction rate it indicates a rapid precipitation of the iron carbide and ferrite from the austenite which takes place at temperatures close to the Ar-1 trans-

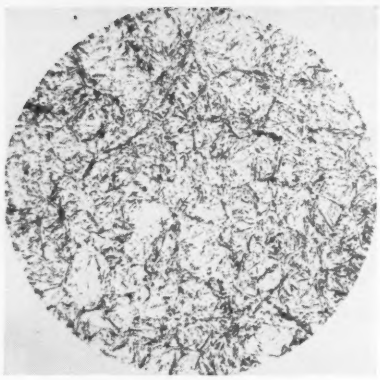

Fig. 1.
200x Dia.
.65 Carbon Steel, 15 Min. at 1700° F. Quenched in Water
Villela Etch

formation temperature associated with stable equilibrium. As a result of this fast reaction rate sufficient time is allowed for precipitation to occur and the temperature at which it occurs provides time for particle growth with the result that both the ferrite and carbide particles will be larger than if the temperature of transformation is lower. In the terms of the patenting treatment this would indicate a coarser pearlite because of the development of thicker plates of cementite and ferrite.

✦ ✦ ✦

A SLOW reaction rate is best described by a slow transformation from austenite to ferrite iron carbide. This slow reaction rate results in the temperature of the steel being lowered considerably below the Ar-1 transformation temperature associated with stable equilibrium to the point that when the transformation does occur, because of the low temperature, time is not permitted for the growth of particle size in the precipitated constituents, the result being that time for growth being absent, smaller particle sizes result. In the terms of the high carbon patented wire this would indicate thinner plates of ferrite and cementite in the pearlite structure. Also, the fact that the sudden lowering of the temperature produces a metastable condition of the cementite and the precipitation, when it occurs, is much more dispersed and results in smaller areas of ferrite as well as a small particle size of the carbides.

✦ ✦ ✦

IT should be borne in mind, however, all references to the use of the reduction of area value in connection with the evaluation of patented materials be strictly confined to air patented materials only.

✦ ✦ ✦

AS shown above, the rate of cooling is an important factor in establishing the position of the Ar-1 transformation and that, in order of importance, takes precedence over the influence of the austenite grain size in this connection. It is necessary, therefore, in using the reduction of area value for this purpose, to make comparisons based on a very narrow range of sizes. In other words, what may be true for a #5 patented rod as regards the relationship between austenitic grain size and reduction of area may not hold true as regards the #12 wire. Also, the particle size developed on air cooling the #5 rod or wire from a given temperature will not be the same as that obtained when air cooling a #12 wire from the same temperature. The reason for this is that because of less mass influence, the rate of cooling is faster and a lower temperature of transformation (Ar-1) than the #5 rod or wire results.

✦ ✦ ✦

GOING further, it excludes the use of this method of evaluation for any single or double lead patented materials wherein a desirable pearlite suitable for wire drawing may be developed by the controlled evaluation of the Ar-1 transformation because of the temperature of the quenching lead. It should be borne in mind, however, that the ultimate in both cases is the uniformly fine pearlite. To demonstrate the above factors, the following photomicrographs have been developed.

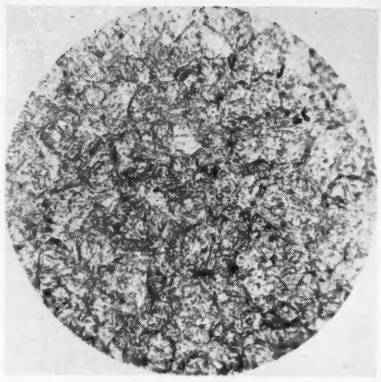

Fig. 2.
200x Dia.
Same as Fig. 1 only 4 min. at 1700 ° F.

Fig. No. 1—Represents a .60 carbon steel water quenched from 1700° F. to determine austenitic grain size. In the air cooled condition a companion sample showed 40% reduction of area.

Fig. No. 2—Shows the same material as shown in Fig. 1 quenched from the same temperature (1700° F.) but with less time in the furnace resulting in smaller austenitic grain size. A companion sample air cooled showed a reduction of area value of 55%.

Fig. No. 3—Same as Fig. 1 but air cooled. This sample showed 40% reduction of area. This photomicrograph taken at 1500x to demonstrate type of pearlite.

Fig. No. 4—Same as Fig. 1 but air cooled. This sample showed 55% reduction of area. This photomicrograph taken at 1500x to show type of pearlite.

✦ ✦ ✦

NOTE the difference in grain size between Fig. 1 and 2. Also, the difference in degree of fineness of the pearlite between Fig. 3 and 4. These photomicrographs are submitted as evidence that, first, the reduction of area value can be used as an indication of austenitic grain size

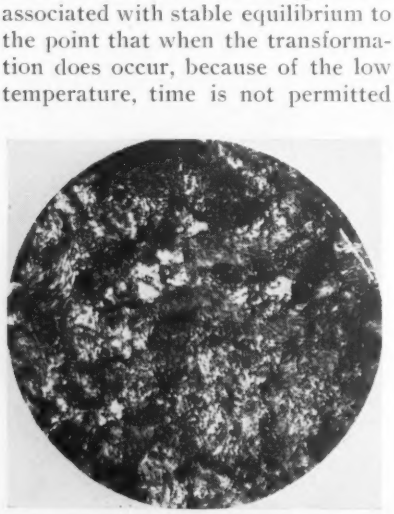

Fig. 3.
1500x Dia.
Same as Fig. 1 but Air Quenched
Red. of Area 40%

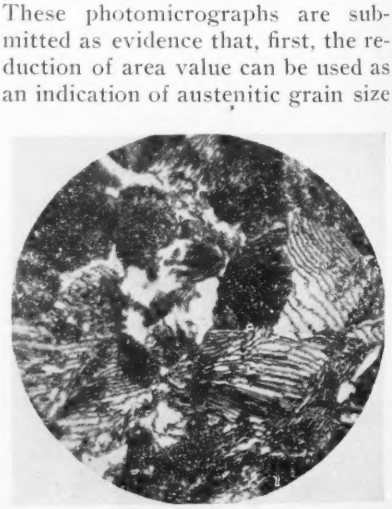

Fig. 4.
1500x Dia.
Same as Fig. 2 but Air Quenched
Red. of Area 55%

and, second, that austenite grain size influences the type of pearlite formed.

✦ ✦ ✦

WHILE up to this point this paper has dealt with a means of evaluation in the patented structure by use of the reduction of area value, no reference has been made to the value of this test as an indication of thorough patenting or of controlled tensile. Our experience has shown that the reduction of area value can be used as a full indication of thorough patenting and the tensile values obtained by making the reduction of area tests can have a definite significance.

✦ ✦ ✦

WE are all more or less familiar with the term "slack" patenting. This term has been used in the industry but has conveyed a more or less hazy conception as to its true meaning. Experience has shown that for a given analysis and a given rod or wire section, that the tensile will mount as the time at temperature is increased up to a certain point and will remain constant from that point on. This tensile value which is stable over a wide range of patenting temperatures and time at temperature, is the one ideal tensile value which we have under consideration. Any attempt to patent to any appreciable lower value must be done at the expense of good heat treatment and will result in an inferior quality in the wire. To demonstrate the variations in tensile which may be encountered due to slack patenting, as well as a relatively stable condition as regards tensile values which can result in good patenting, we present Fig. 5. This represents plotting of a large number of results

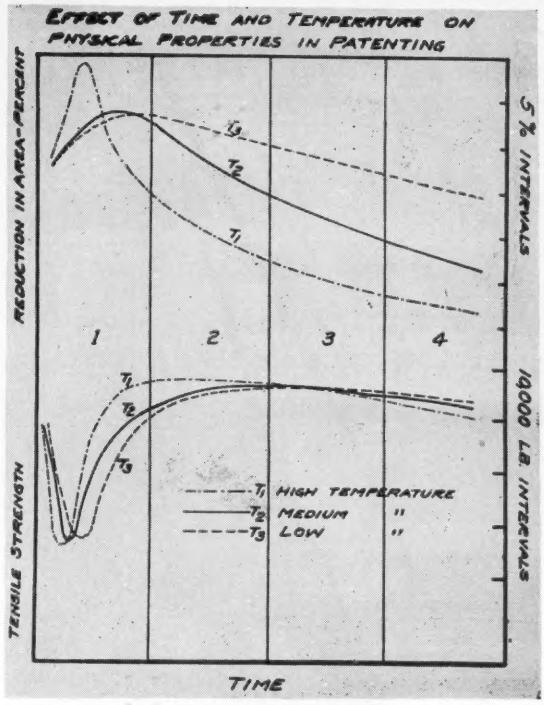

Fig. 5.
Air Patenting

obtained by varying the time of exposure to three ranges of temperature. In each case the final results are the same and in each case the importance of sufficient time at temperature to develop the right tensile values is plainly apparent. The samples in question were placed in a muffle furnace at various temperatures, but in any given group a constant temperature was employed. The other variable being the amount of time at temperature. You will note that studying the samples taken at various intervals of time shows a lowering of the tensile value of the original material to a given point followed by gradual rise until the normal tensile is reached, at which time this normal tensile will persist over an extended period of time. It is our contention that any materials patented to a tensile below that of the normal patented tensile are improperly patented and will not make good quality wire.

✦ ✦ ✦

YOU will note also included in the chart shown in Fig. 5, are reduction of area values. While it is evident, as shown above, that the tensile strength levels out upon complete solution of the constituents, the reduction of area value is continually lowered as the time at tempera-

(Please turn to page 962)

Influence of Patented Red. in Area on Ductility of Drawn Wire

Sample No.	1	2	3	% Reduction in Drawing
Patented Size	.120	.120	.120	
Red. of area				
As patented	32%	40%	51%	
After 1st draft	33	39	48	34
" 2nd "	38	39	45	37
" 3rd "	42	43	43	32
" 4th "	47	45	41	31
" 5th "	52	46	38	31
" 6th "	56	49	37	29

.68 Carbon - .74 Manganese

Fig. 6.
Table Showing Influence of Patented Red. of Area on Wire Ductility

Influence of Red. in Area of #5 Rod on Drawn Wire

Sample No.	1	2
Red. in area	44%	53%
After 1st draft	44	49
" 2nd "	46	44
" 3rd "	49	38
" 4th "	52	35

Fig. 7.
Table Showing Influence of Rod Patented Red. of Area on Wire Ductility

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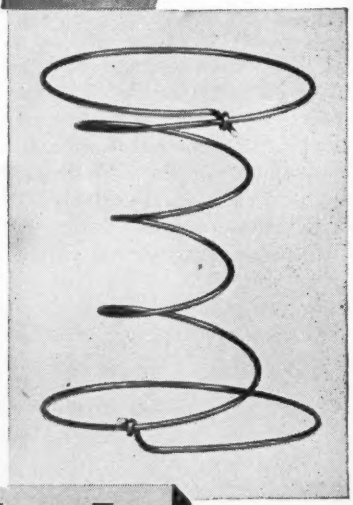

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Wire Galvanizing—Herman Process

By Rowland Hussey,
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THIS is not a technical paper, but rather a description of a comparatively new way of applying zinc to carbon steel wire, through a hot dip method called the **Herman** process.

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THE origin of the process name is that of the inventor, **Joseph L. Herman** of Peoria, Illinois. Much credit is due Joe Herman in the preparation of this paper, and also to several of the men working with the author in the Wire Department at Aliquippa, in developing that which is now presented to the Wire Association.

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JOE Herman, who had been concerned for many years with the application of zinc coating on steel wire, by hot dip method, in the early 20's began analyzing in a practical, matter-of-fact manner, the difficulties theretofore attendant in applying zinc in such a manner as would produce smoothness, a higher degree of purity of zinc on the surface of the wire, greater freedom from oxides and objectionable inclusions, tightness of coating, a higher degree of ductility, a more uniform application of the molten zinc, and a brighter article. Mr. Herman must have developed the courage of his convictions, with which he became obsessed during years of analytical work, for in the early 1930's, he set up a pilot plant in the basement of his residence and really went to work. He says he built a small galvanizing unit —this is his description of it. The galvanizing unit entailed an expenditure of $8.00 and 60 odd cents, the acid tank was a 5-gallon crock, the reel was the heavy end of a baseball bat, the pot was of 1/8″ steel—10″ deep, 16″ long and 8″ wide. The take-up frame was an old Ford crank with 2x4's for the frame and bearings. The motive power was Mrs. Herman, turning the crank.

A paper presented at the Wire Association Convention held in Chicago, Illinois, October, 1945.

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FROM the ideas that for several years had been developing in Joe Herman's mind and the practical application of his thoughts, through the use of crude equipment installed in the basement of his home, came the process of hot dip galvanizing, known to us now as the Herman process.

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A DESCRIPTION of the Herman Process probably can be set forth more clearly through reference, at times, to the well known charcoal process, with which many a wire mill man is so familiar.

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ALL methods of applying molten zinc to wire differ very little, if any, in the galvanizing line to the point where the wires actually emerge from the spelter bath. All hot dip galvanizing lines in general, comprise annealing equipment, such as lead pans, acid vats, flux boses, spelter pan and the take-up frame. In the production of the most lightly coated galvanized wire, commonly called Type I, the wires emerge from the spelter bath at an angle of about 20 degrees, are exposed to the atmosphere for a matter of eight (8) or ten (10) inches and then pass through wipes, such as wads of asbestos rope compressed under hand-operated screws or weighted levers, into cooling water and on to take-up blocks.

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IN the heavier coatings, such as the so-called Type III coating, the wires pass through the spelter bath, but at the outgoing end, the direction of travel is changed under a sinker roll submerged at desired depth in the bath and the wires emerge in a direction nearly verticle to the spelter surface to guide sheaves overhead. In the case of charcoal-wiped wire, a bed of charcoal is maintained, in design or style suited to the individual in attendance, at the area on the spelter bath where the wires emerge and travel upward. In the case of Type III galvanized wire produced by the Herman process, a device called the Herman machine covers an area of the spelter bath at the outgoing end; an area larger in extent than is usually used in floating a bed of charcoal.

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WE refer to that part of the equipment which is peculiar to the Herman process as a machine, because it truly is a machine in every sense of the word. Its frame is fabricated of steel plates and shapes, it supports motors which drive devices to cause zinc to flow or circulate, it has rolls fitted with anti-friction bearings, it is equipped with a precisely made water quenching device for quickly cooling the coated wires, gas is employed in its operation for a specific purpose and adjustments in all directions closely approach micrometer likeness, and it carries the outgoing end sinker roll. You may well sense, in this casual description, that the Herman process involves a method of treatment in the

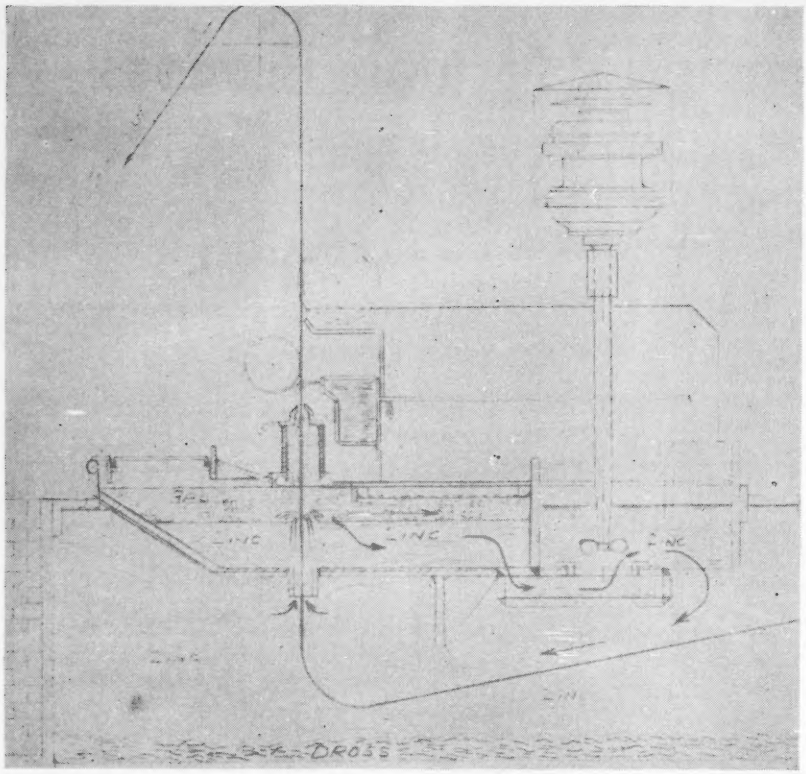

Figure 1.

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production of galvanized wire, wherein the human element is controlled by mechanical means, rather than depending on the whims, experiences or desires of a workman, building a charcoal pile and keeping it wet with tallow.

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THE Herman machine is, in principle, an auxiliary spelter tank partly submerged in the bath of the main kettle. The bottom plate of this auxiliary tank has a slot of such dimensions that will allow the passage of all the wires, thirty-six (36) in this case, upward through it. Plates are welded around the slot, on the inside of the auxiliary tank to form a riser through which spelter will flow when put in motion, as it is done in this process. This riser is called a nozzle and is about 10 inches in height. The auxiliary tank, therefore, can contain a bath of spelter in itself.

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IN the rear end plate of the auxiliary tank, an outlet duct is provided and means employed at the outlet to move molten spelter from the auxiliary tank and expel it into the main bath. Motor driven impellers, two (2) in this case, cause the spelter to flow from the auxiliary tank to the main bath. As the level of zinc in the auxiliary tank is lowered, molten zinc flows upward through the slot and nozzle in the bottom of the auxiliary tank and as long, therefore, as the impeller motors are in motion, a continuous and steady flow of molten zinc is maintained upward through the nozzle and through the auxiliary tank, to the bath in the main kettle.

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THE auxiliary tank is totally enclosed to form a chamber, except, of course, for a slot in its top, corresponding with the slot and nozzle in the bottom, but the space enclosed therein is not completely filled with spelter; a large part of the enclosed auxiliary tank is for atmosphere, of a type and for a purpose described later.

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IMMEDIATELY above the upper or outgoing slot in the auxiliary tank, a water nozzle is so positioned to direct a solid stream of clear water across or at right angle to the plane of travel of the galvanized wires. Opposite the water nozzle, a roll is placed to hold the upgoing wires steady and in a fixed position, relative to both the upper slot and the nozzle in the bottom of the auxiliary tank.

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IN the enclosed space, not filled with zinc in the auxiliary tank, means are provided for introducing natural gas, to prevent an oxidizing atmosphere, and thus keep the galvanized wires bright and clean while the zinc is solidifying and to the point where they can be quenched by water.

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THIS, in a nut-shell, is the mechanical description of the Herman machine. In operation, it must, of course, be positioned directly beneath the overhead sheaves, guiding the wires to the take-up frame. It must be properly leveled, adjusted for clearance and securely anchored to the main kettle, against the buoyancy of the main bath, in which it is partly submerged, and more especially to counteract the upward pull of the wires. Positioning the machine, adjusting it and securing it firmly in place is done readily and precisely, and by reason of the ease, quickness and precise manner in which such work can be done, the human element at the most important point in the galvanizing line is reduced to the minimum during operations.

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IN the use of such a machine, we have means for surrounding the wires being galvanized with a clean supply of molten zinc, maintaining the wires free of contact with anything except the zinc and an atmosphere while solidification of the zinc takes place, keeping the wires surrounded with an atmosphere during solidification of the coating and beyond that point to the place where temperature can be reduced to a value where the galvanized wires will retain their luster and precise means for eliminating the human element at the point where quality of coating is largely determined.

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MAIN points in the design and construction of the Herman machine merit further consideration.

The outgoing end sinker roll is mounted in bearings, the housings of which are an integral part of the machine. This roll had to be made so it would actually rotate and turn continuously and smoothly under all conditions and for long periods, while immersed in a bath of molten zinc. Considerable work had to be done at this point, but through special treatment of the roll journals and success in searching for bearing materials that would operate in molten zinc, the roll is now a smooth running piece of equipment. The roll journals are cased in Steelite metal, deposited by electric welding and the journal bearings are blocks of carbon, similar to carbon brushes used in electric motors.

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AFTER the wires, being galvanized, leave the sinker roll and turn upward, they pass through the nozzle in the bottom of the machine. Flowing upward through the nozzle at the same time continuously is a stream of molten zinc, kept in steady circulation by the motor driven impellers working to reduce the level of zinc in the machine, so that flowage obtains at the nozzle. The circulating stream of the molten zinc is rather shallow, compared to the total depth of the main kettle, therefore, the supply of zinc in the final stage of galvanizing the wires is well above any dross line and the stream of molten zinc is so widely dispersed on being expelled from the machine, that newly formed dross has space in which to settle and not be included in the return flow to the nozzle stream.

IN the space within the chamber of the machine, not occupied by zinc, a space of about 6 cubic feet, natural gas is introduced in quantities that will provide an atmosphere that is not oxidizing to appreciable degree. In the span of wire surrounded by this atmosphere, excess spelter on the galvanized wire drains into the pool below and solidification of spelter retained by the wire takes place. Thus, it is possible to prevent oxidization of the zinc coating while it is solidifying. Furthermore, drainage of excess spelter from the galvanized wires takes place at a point and under conditions that make for a very uniform and concentric layer of coating on the wires.

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IMMEDIATELY the galvanized wires leave the machine chamber, through the slot in the top plate of the machine, they pass through a solid stream of clear water. Since the water hits the wires slightly below the steadying roll on the opposite side, complete solidification of the zinc coating is assured before the galvanized wires come in contact with any hard material or abrasive substance.

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THE water nozzle and steadying roll opposite thereto is no casual combination of two (2) devices, but rather a well developed application of a stream of water, not a spray, in such a manner that provides sufficient quantities of water for reducing the temperature of the galvanized wires below oxidation point, yet practically prevents any of the cooling water falling through the upper slot and chilling the zinc below and, at the same time, allow the water to run off through proper drainage channels.

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IT cannot be said that actually no water splash occurs and that the stream of water is controlled so perfectly under all conditions, to preclude the possibility of water dripping through the slot into the machine chamber. Actually, however, a flame of burning gas issues from the machine chamber through the same upper slot and practically blows any drippage of water away from the opening.

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IT is obvious, therefore, that the action of the Herman process and the treatment of wires being galvanized by this process differs greatly from that done by the so-called charcoal wiped process. Any statements made in reference to the charcoal wiped process must not be construed as condemning that process. Any references, heretofore made and those that may hereinafter be made, are cited only for the purpose of showing differences and to emphasize the more favorable conditions afforded in the Herman process for an enhanced quality of zinc coating on steel wire.

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IN the Herman process, by way of review, we have a well made machine, rigid and steady to reduce vibrations, mechanical adjustments that take guess work away from

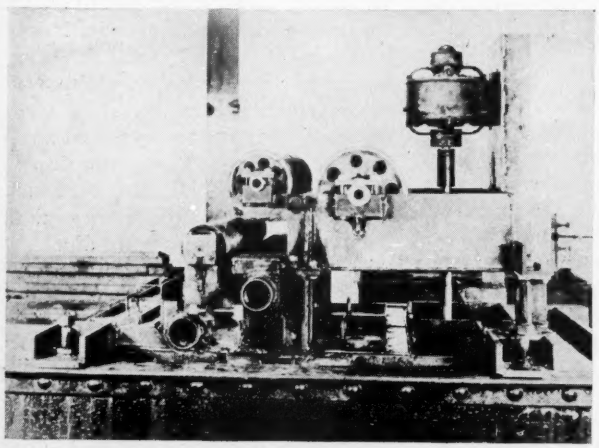

Figure 2. ✦ ✦ ✦ ✦ ✦ ✦

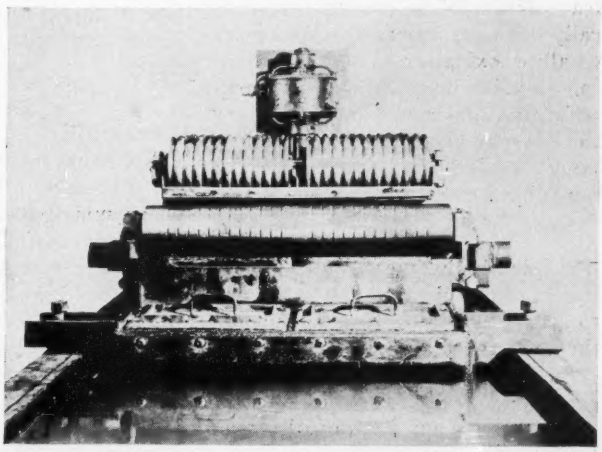

Figure 3. ✦ ✦ ✦ ✦ ✦ ✦

operators, the application of the purest zinc obtainable in a bath, at the final stage of the zinc application, a space in which excess spelter can drain freely and naturally while wires are running smoothly without that much vibration which would adversely affect the coating, a non-oxidizing atmosphere surrounding the galvanized wires while solidification of the coating takes place, and the application of water to enhance the natural luster of the zinc.

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IN the charcoal wiped wire process, many of these fundamentally good features are lacking. A smoothly turning sinker roll at point of exit from the spelter bath could be used and maybe is used in many installations, but it is not one of the prime requisites as it is in the Herman machine. Also, it does not necessarily bear a definite relation to some of the other features of the process. The galvanized wires pass from the bath to the air above through a bed of charcoal or some granular substance. While the surface of the spelter bath beneath the charcoal may appear clean and free of undesirable substance, skimmings and ash can collect at this point and, surrounding the wires, can cling to them and be drawn off by them. The zinc coating is fluid on the wires as they enter the charcoal pile and, in some sizes of wire, probably at some distance above the charcoal. These conditions offer the chance for the coating to become abraded to some extent, to pick up skimmings, ash or other undesirable substances, for excess spelter to drain ununiformly, to leave the solidified spelter eccentrically disposed around the steel core, to allow oxidation of the zinc coating to take place at elevated temperatures, and conceivably to allow the development of a secondary layer of zinc-iron alloy, after the wires have emerged from the kettle.

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THE depth, thickness, and compactness of the charcoal pile is subject to variations from turn to turn as the various operators take over. The character of the charcoal pile is ever changing and forever requires conditioning work on part of the man tending it.

SINCE the application of a steadying roll to reduce vibrations would have to be made well above the charcoal bed, its usefulness, as a means of preventing harmful vibrations of the wires while the coating is solidifying, would not approach those results which would naturally obtain could this sort of a roll be mounted only a few inches above the point where the galvanized wires leave the bath.

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OUR experience with the Herman process for galvanizing wire began late in 1936, when we installed a machine on an experimental basis. It worked well from the start, but the need for changes, relatively minor in nature from a product standpoint, became obvious as we gained experience in operating it. The sinker roll journals and bearings demanded attention, to promote smoothness of operation and particularly longer life. The application of water quench presented a problem, guide rolls were not properly applied or rather there were more than were necessary, as we found later, and the circulating system lacked something to be desired.

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AS we operated, we made changes. Joe Herman would give us credit for much pioneering work, but we did not pioneer the process so much as did we improve operation of the process as we went along; only a natural occurrence in working with a new process involving something entirely different in the way of equipment. Ours was not the first application of the Herman process, but the second one put in commercial production.

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SUCH improvements were made in the machine and the results were so promising that the Herman machine was completely rebuilt, to incorporate, in a substantial and mechanically good manner, all the improvements we had conceived. In the early part of 1938, the Herman machine was installed in a permanent way on the one (1) frame theretofore used as a charcoal frame. In September, 1940, an additional galvanizing line was installed to use the Herman process. Since the latter date, we have operated two (2) galvanizing lines, using the Herman process and many tons of high quality galvanized wire, in the Type III coating range, have been produced.

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IN the range of coating weights, for which the Herman process is so well suited, the galvanized wire is highly competitive for such uses as cable armor wire, rope wire, and for all galvanized wire for normal crimping and twisting operations. Particular reference is made to galvanized rope wire produced by the Herman process; quality of the galvanized product for such application is outstanding. Tensile are well up in the specified ranges for all rope grades, torsional values are maintained well above the specified minimum, coatings are uniform, smooth, lustrous, and resist abrasion exceedingly well.

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GALVANIZED wire made by the Herman process is readily drawn to diameters corresponding to 95% reduction in area, with speeds in some of the finer sizes regularly hitting the 2000 f.p.m. mark. Wrap tests made regularly on the drawn-down galvanized stock show no surface peeling, but rather a hard, dense surface of comparatively high luster.

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PRODUCTION rates, normally obtained, are slightly higher than those we experienced with the charcoal process and the spelter carry-off is no greater on comparable sizes. At normal operating speeds, it will be found that the ratio of alloy layers to the pure zinc content of the Herman galvanized stock is so balanced that the theoretical Preece test, coating weight relationship is maintained, that is, .18 oz. of zinc per square foot of surface are equivalent to one (1) one-minute dip.

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THE production of galvanized wire by the Herman process, hot dip method, has long since passed beyond the experimental stage. It is a firmly established process and in the

coating range to which it is so well adapted, the product of this process stands high in competitive quality. The author would not close this article, leaving with you the impression that we have attained the ultimate in developing the Herman process. The process can probably be developed to a higher degree of perfection; possibilities are manifest.

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EXCELLENT as are the products of the Herman process today for many applications, many other applications for the products of the same process can probably issue through research work on the equipment and its operations, but once you get a new piece of equipment in production in a steel mill and the boss starts crowding you for tons, you don't do much research work with a production unit.

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An Appraisal Of The General Business Outlook

By R. L. Hamaker,
Asst. Gen'l. Mgr. of Sales, Republic Steel Corporation,
Cleveland, Ohio

I HAVE been asked to talk to you today about what business can reasonably expect in the years immediately ahead. Forecasting is a risky pastime and much of what I have to say is opinion, based on the best facts available to us. Since the steel business is a very sensitive barometer of business conditions in general, we try to study trends in many lines of business for their possible effects on our own operations.

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I NOTE from your program that you have had a number of technical discussions and I assume that most of you are technically trained men. I want to make clear at the outset that I cannot talk to you in technical language. One of our top metallurgists says he always tries to make everything so simple that even a salesman can understand it. I don't know whether I can put the reverse English on that statement or not.

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IF you try to follow the published writings of the various economists plus the cackling that goes on in certain government quarters about sixty million jobs, you can be excused for being slightly punch-drunk, particularly since even taxi drivers have become economic experts.

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ONE school of economic thought predicts a period of very high business activity for a number of years, and we ourselves believe that if the excess electric furnace capacity, which was put in for aircraft steels and armor plate, is left out of the consideration, the steel industry faces capacity operations for at least three years and perhaps longer.

Mr. Hamaker was the Guest Speaker at the Annual Wire Association Luncheon at the Convention held in Chicago, Illinois in October of this year, and presented this address at that time.

THERE are other economists who point out with some truth that the goals of total employment and national income set by the popular press for the post-war years represent a 50% increase in per capita consumption of all goods and services as compared with the year 1939, and question the possibility of gaining in seven years as much as the nation gained per capita in the previous forty years. Whenever you try to discuss all business as a total, you encounter conflicts which are almost impossible of reduction to sound conclusions and I am, therefore, going to talk about how things look to us in the steel business and let the economists argue about the rest of it.

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THE accumulated shortages of consumers' durable goods are so well known and so widely publicized that it is hardly necessary to quote any figures. Our studies indicate that all of our major steel consuming markets are still there and for a few years at least many of them apparently will need more steel than we are able to give them. We can find no evidence that any steel market of importance has been even seriously invaded by competing materials.

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The Automobile Industry

THE automobile industry, normally the largest steel consumer, has entered the peace, if I may use that term in this connection, with the largest backlog of unfilled demand in its history. Back in 1941, with six million unemployed, Americans were driving 29 million automobiles. By the end of this year we may be down to around 23 million or less. If employment in the years immediately ahead is higher than in 1941, which seems quite likely, we may need 33 or 34 million cars instead of 29 million. In any event, the industry itself estimates that if it operates at a 5 million car annual rate, a record rate by pre-war standards, it will take until 1950 to catch up.

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WE likewise do not expect radical changes in car design. Big improvements will be made and made rapidly, but the predictions of small air-cooled engines running on high octane aviation fuel don't look too practical at the moment. The truth is that the super-fuels must be so heavily leaded to retard the flash that they can only be used in motors which get a complete overhaul after every two or three hundred hours of use, which would be impractical in automobiles. Also, when it is considered that each cylinder on the larger aircraft engines develops as much power as a Cadillac car, the question arises as to the safe and economical application of such power to a passenger automobile. The plastics and light metals I'll touch on later.

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Housing

ALL experts agree that a tremendous housing shortage exists in this country. The market is estimated at one million homes a year for at least 10 years, and we have never come close to building a million homes in a single year before. Even a small home, with its appli-

ances, requires nearly two tons of steel. High costs may nip this budding boom, though the economy can support somewhat higher costs without too much difficulty. As recently as 1939 one-third of the families in this country had incomes below $1,000 and two-thirds had less than $2,000 per year. In January of this year 86% of all families had incomes above $1,000 and more than half were over $2,000. In actual numbers the incomes over $2,000 increased from 10 million families to nearly 21 million families. This brought home-owning within the range of possibility for millions who could not previously afford it.

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TO satisfy the tremendous backed-up demand for homes, automobiles, appliances, furniture and almost everything else, the American public has on hand or within reach a huge volume of cash. There has never been anything like it in the history of this country or of any country. There have been so many guesses at the sum total of private savings that I will not attempt another one, but certain figures are known and can be checked. For example, savings deposits in banks are now 30 billion dollars. Life insurance in force totals 148 billion. National service insurance now has a face value of 125 billion. I don't know what the War Bond total is but it runs into many billions of dollars.. Please remember that before the war the total national income never reached 100 billion dollars. All of this provides a satisfactory answer, to my mind at least, to the question frequently heard, "Where is all the money coming from?"

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ANOTHER impetus to more homes is the fact that the average family size is declining, while the median age is changing rapidly toward an older population in this country. The average family size was 4.1 persons in 1930. It had declined to 3.8 persons by 1940. The median age, or the age point which had half the population above it and half below was 26.5 years in 1930. It was 29 years in 1940 and is rising. Smaller average families means more dwelling units to house the population. Higher average age means more conservatism; tending toward increased home ownership.

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HERE again our studies indicate that post-war houses will not differ greatly from pre-war houses, and the dream homes with air-conditioning, solar heat, roll-away roofs, concealed automatic lighting and similar radical departures will be far beyond the reach of the average citizen for a long time to come.

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Agriculture

THE farmer has come out of the war in the best financial condition in his history and will be a very large buyer of many things made of steel. He has piled up a far bigger list of deferred wants than the average city man and has the cash to satisfy them when implements, building materials, fence, nails, posts and a myriad of other things become available. I make no pretense of knowing the farm market intimately but it seems to me that the farmer may be a big market factor for relatively few years, though he will have to keep up with the rapid advances in farming technology.

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IT seems reasonable to suppose that our Allies, after two harvests at most, will return to their normal sources of food supply. Our own food production, up 25% during the war, will continue at a high level even if prices fall, for the forces pushing it up, such as improved technology, are largely independent of price changes. This looks like large agricultural surpluses in the relatively near future and if they are large enough, farm commodity prices will break through the government support levels. It is estimated that if national income increases 20% in the next ten years, with a normal population increase of 5%, domestic food demands will rise 9% while production will increase 15% in the same period. The old farm problem of chronic surpluses has not been permanently cured by the war.

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Railroads

THE railroads, always a big steel customer, will require great tonnages for deferred maintenance alone. The average major road will replace 10% of its main line rail each year. This hasn't been done since the war began. The wear and tear on motive power, rolling stock, bridges, structures and buildings has been enormous. We do not expect an extensive program of new freight car buying by the railroads. Existing equipment has handled the largest volume of freight in our history for the greatest number of ton-miles and there is no reason to expect a greater total freight volume in the early post-war years. We expect a normal replacement volume of around 85 thousand cars per year.

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PASSENGER equipment is an entirely different story. A check of the leading roads shows that almost without exception they are planning or have on order light-weight, high speed equipment with which to provide a low cost service to counter the increased competition of the airlines. I doubt that there will ever be another sleeping car built with curtains in the aisles.

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Air Transportation

AND speaking of airlines, it may be well to take a quick look at the aircraft industry. At its war-time peak it was producing between 8 thousand and 9 thousand planes a month. Before the war this country was the world's best equipped with regard to commercial airlines. We had a grand total of 372 planes in service on all runs, roughly one or two day's output for the present industry. No matter how fast civilian and commercial flying expand we do not see how this great industry, the war-time leader in dollar volume, can operate above 5% of its war capacity.

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THE enthusiasts who predict air freight on a grand scale and a helicopter in every backyard will have to wait a long time to see their dreams come true. Air freight today costs 15 cents per ton-mile. The railroads do it for less than one cent. A private plane requires a minimum of $2,500 worth of instruments alone for safe flying and navigation. This puts flying beyond the reach of most citizens unless they are satisfied to

stay close to home or navigate by landmarks on the ground such as highways and railroad lines.

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Public Works

I WILL not go into detail on projected public works, though it is well to mention that a national trunk highway system is in the final planning stage. These super-highways will be built to by-pass or over-pass small cities and towns with grade crossings eliminated. A great network of feeder roads will be necessary and large tonnages of steel will be required for reinforcement, guard rails, drainage and structures. Our present highway system is inadequate for any large expansion of automobile traffic in the heavily settled sections of the country.

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Aluminum Production

IN passing I would like to touch on the light metals and plastics and their probable effect on the steel industry. Aluminum capacity was multiplied 7 times since 1939, and the disposal of government owned plants is now one of the major headaches in Washington. I noticed last week that a syndicate had been formed to purchase these government plants for 100 million dollars. They represent about half the total capacity of the industry. The peak production of aluminum was 1½ million tons and 90% of it went into the aircraft industry. Whether peacetime applications can be found for this tonnage of a material that costs roughly ten times as much per pound as steel is highly questionable. In any event, the total aluminum production, allowing for the weight differential, amounts to about 3% of the steel industry's capacity. We could have produced last year's aluminum tonnage in 4 days.

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Magnesium

MAGNESIUM is the other light metal which had a big wartime boom. Production was expanded to 70 times the pre-war level and the metal was largely used in incendiary bombs, flares and certain aircraft applications not subject to shock or stress, such as cowling, dust covers and instrument panels. It is one-third lighter than aluminum but also more expensive, costing 20½ cents per pound in the ingot. Magnesium has many fabricating limitations and its physical shortcomings make its use unlikely for applications where structural strength is required. The output is small by steel standards, the total annual capacity being around 265 thousand tons.

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Plastics

NOW we come to the plastics, a loose term which covers a great number of different but related products. Plastics are not a tonnage industry, as practically all metals are. Even magnesium is being produced in twice the volume of the entire plastic output.

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IN the case of plastics, the economic factors I mentioned a while ago may again be expected to function. No one has yet developed a plastic molding powder to sell for less than 14 or 15 cents a pound and the transparent and translucent types are much higher.

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THE plastics have some major physical shortcomings which make it improbable that they will be used for structural applications. The strongest plastic has a tensile strength of only 30 thousand pounds per square inch. Plastics are woefully inferior to metals in shear strength, impact and flexural strength.

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THEY lack surface hardness and most have poor resistance to abrasion. Automobile windows of plastic material have been tried but the abrasive action of dust particles in the air soon destroyed their transparency. The plastic automobile top, one of the fondest dreams of the air-brush engineers, looks impractical for this reason if no other.

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GREAT power is required to mold plastics in the larger sections and the process is very slow because heat must be applied to the dies and the material permitted to flow. In the absence of any method of joining plastic components except by mechanical means, such as bolts and screws, it seems unlikely that any large units such as refrigerator cabinets, for example, could be made except at prohibitive cost.

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PLASTICS likewise cannot be used where continuous heat above 400° F will be applied and frequently much lower temperatures cause embarrassing problems. For example, plastic pipe was tried experimentally in several units of a government housing project recently. Aside from some difficulty in making joints, it worked all right until someone ran the water temperature above 180° F. While the plastic pipe did not fail, it got decidedly limp.

✦ ✦ ✦

PLASTICS have their advantages, such as adaptability to built-in color, surface permanence in ordinary use, low specific gravity, resistance to corrosion, good electrical insulating properties and many others, but they won't have any adverse effect on the steel business.

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The Export Market

BEFORE I close, there is one aspect of our industry I should like to touch on and that is the export market. The United States has never been a heavy exporter of the common tonnage steels. A few years ago Belgian mills were laying down wire nails 100 miles inland from the Texas Gulf Coast at a price per ton lower than our cost on the rods from which we draw the wire to make the nails.

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OUR export manager has some highly optimistic views on conditions which he says will change this situation. He points out that not only will our conquests open up markets that heretofore have been almost complete dormant as steel consumers, but that the German, Japanese, Belgian and French steel industries will be largely eliminated from world markets for years to come. He thinks the total output of French and Belgian mills will be required to rehabitate western and central Europe,

(Please turn to page 964)

The Technical Discussions At The Convention

Supplementing the report of the general activities at the Wire Association Convention held at Chicago, October 15-18, 1945, herewith is presented a digest of the discussions at the various technical sessions — Complete stenographic minutes will be published in the January, 1946, issue of WIRE and WIRE PRODUCTS. ✦ ✦ ✦

THIS year's meeting of the **Wire Association,** LaSalle Hotel, Chicago, Oct. 15-18, will go down as one of the best annual gatherings ever held by the association. The well-rounded agenda of papers dealing with ferrous and non-ferrous wire manufacture led to sustained discussion from the start to the close of the technical sessions.

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N. Ransohoff, president, the Ransohoff Co., Cincinnati, O., at the opening technical session, Monday afternoon, described a new process which dewhiskers nails faster and cleaner to a brighter finish and with a saving in product and labor than heretofore possible. Cleaning nails, he said, involves two important steps. When the nails come from the dies, they are coated with a mixture of lime and soap, which must be removed. The second phase involves the elimination of the whiskers left by the cutting knives which point the nail.

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THE speaker showed a design of the machine used in the process and pointed out that when a batch of nails has been collected, it is charged into the drum equipped with a patented loading cone which prevents spillage. Here the nails are tumbled in a hot detergent solution which removes the lime and drawing compound. The solution is recirculated.

✦ ✦ ✦

THE whiskers are removed and screened out through blind screens during the cleaning cycle. They are caught in a chip basket or if they are to be sold they may be continuously removed by a drag conveyor to a rotary dryer, Mr. Ransohoff explained. Cleaning and burnishing take place in the first drum since the nails are permitted to rub on each other while being lubricated by the detergent solution. A brighter nail thus is produced than is possible by the old method of sawdust tumbling, the speaker contented. Faster cleaning is also achieved since the cleaning solution softens the dirt.

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WHEN the nails are cleaned and dewhiskered, the direction of the drum's rotation is reversed and the nails automatically pass out into a second drum where they are dried and polished by tumbling in sawdust. Instead of sawdust some plants use cob meal since it wears longer. Cob meal while more expensive is more absorbent and has a better polishing action than the average run of sawdust, the speaker related. The second drum is heated to warm the sawdust and help in drying the nails. When the polishing action is complete, the drum is reversed and the nails and sawdust are emptied from the drums onto a vibrating pan. Here the sawdust is sucked up into an exhauster and returned through a cyclone separator to the sawdust barrel. The nails continue onto the shaking pan and are dropped into the kegs ready for weighing and heading.

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IN answering various questions asked from the floor the speaker had the following to say. When cement coated nails are being processed sticking or holding back may be prevented by leaving them in the cement coating drum until perfectly dry. The machine will handle nails from ¼-in. brads to 60-penny; for smaller nails, the speaker recommended a smaller unit. In expressing his views on cost comparison, Mr. Ransohoff pointed out that the first cost is higher than tumbling mill practice. While maintenance per hour might run higher, he explained, the keg production per hour and the cost per keg will be lower. Cleaning time averages about one hour for two 40-keg batches. However, he stated, when carbide cutters are employed, the nails are much cleaner than the old style and therefore it might be possible to get below two batches per hour. If no whiskers were present, he explained, it might be possible to complete the cleaning of a batch within 15 minutes.

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Kenneth B. Lewis, Consulting Wire Mill Engineer, Worcester, Mass., and chairman of the meeting pointed out that the man-hours per keg of nails vary in various cleaning departments. The spread is as high as 3:1 in mills in this country. In England, he explained, nails from the cleaning machines are discharged into bags, automatically weighed, tied, kicked off and conveyed out of the way. In this country, he emphasized, we tolerate poor conditions at the kegging stations and beyond. We have nail mills almost dehumanized up to the kegging stage but beyond operations are practically unchanged from methods used years ago. It was suggested that a merry-go-round be installed at the kegging station in order to speed up production and facilitate handling. Mr. Ransohoff was of the opinion that electric feeders made to shut off at any weight might be used effectively in kegging the product. The hopper, he explained, could be built with a V-bottom, the bot-be built with a V-bottom, and two electric feeders installed.

WOODEN kegs are becoming more expensive and their use is being challenged, it was stated. One nail producer mentioned that plywood and fiber board containers have been used but not with favor. Another producer employed a square container for packing nails but because these could not be handled by rolling, the mill was obliged to go back to the use of kegs.

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F. H. Morral, Metallurgist, American Cyanamid Co., Stamford, Conn., in speaking on "Molten Salt Baths for the Wire Industry" presented a painstaking review of salt bath applications in the wire industry as well as a bibliography of fused salt functions. Some of the requirements of a molten salt in its working temperature range, as mentioned by the author, includes inertness to work and holding pots, maintenance of its composition, no sludging, low "drag out," ease of washing, low vaporization loss, desirable cooling rate for quenching purposes, little or no hygroscopicity at room temperature when on metal work, and reasonable cost.

✦ ✦ ✦

IN commenting on Dr. Morral's paper, William Adam, Jr., Ajax Electric Co., Philadelphia, mentioned that a noteworthy improvement in furnace design has been the utilization of suitable refractory pots for many heat treatments previously carried out in metallic alloy pots. Ceramic-type salt containers have directly lengthened pot life in high-speed steel tool hardening installations (2200-2400° F) from three to six months service previously rendered by alloy-type pots to the two to four years operation now established as normal service before pot replacement is necessary. Applied also to neutral hardening baths, which operate with the temperature range of 1500-1750° F. refractory pots remain in service four years and longer in contrast to previous life of from one to two years for alloy pots.

✦ ✦ ✦

USE of refractory-type bath containers and better alloys for immersed-electrode heating of molten salts, the speaker explained, have made it economically feasible to build salt bath furnaces of any size or shape, as well as automatically conveyorizing the processing of work on a continuous basis.

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CONSEQUENT commercial development of the salt bath process called "isothermal quenching" is perhaps the most heat treating advancement for peace time industrial application. This quench and temperature method has drastically lessened distortion and improved physical properties on a multitude of products such as gears, springs, cutlery, etc. Many metal products, previously necessitating costly finish-grinding operations due to excessive warpage under heat treatment will not permit finish-machining prior to this isothermal processing — thus effecting substantial savings.

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ANOTHER new development, dependent upon the use of refractory-type pots, is the application of salt baths for annealing stainless steels at temperature between 1650-2000° F. The inherently faster heating rate of salt baths coupled with their characteristic avoidance of scale formation, established new records for high production and low-annealing costs for all kinds of stainless steel.

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AIRCRAFT production needs led to the construction of the largest immersed-electrode baths ever built, some with baths weighing 85 tons.

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UNIVERSAL recognition of the merits of salt baths for the heat treatment of molybdenum steels is attested by the fact that more high-speed tools are treated by salt baths than by any other method.

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IN pickling stainless wire with hydroxide the reaction is complete in 15 to 20 minutes, according to comment from the floor, though the steel can be left in the solution for 24 hours without harm. The speaker advised that when the reaction is complete then reduction is also complete. He advocated holding the temperature of the caustic solution at 700° F. When the solution is built up to a concentration of ½ to 2 per cent sodium hydroxide any grade of stainless, alloy, bi-metallic strip, stainless-clads, chrome-nickel steels, composite sheet, etc., can be pickled with this solution. The cost on the average run of material ranges from 50 cents to $2.00 a ton. It was brought out also that to be economical the hydroxide pots should be operated 24 hours a day.

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IN drawing nickel-resistance wire 25 years ago, a member of the association stated, we began using salt baths and were able to give a 75 per cent reduction first using graphite to get the piece started through the die hole.

✦ ✦ ✦

THE question was raised concerning the use of borax as a coating material. One member stated that while it takes time to anneal in borax the situation is greatly helped by the addition of a small amount of fluor spar. Annealing with borax requires approximately 20 minutes whereas with the use of borax and fluor spar the annealing time is reduced to 3 minutes. The solution should be maintained at the minimum temperature of about 1000° F.

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SPRING manufacturers find that they have to observe quality of production as well as efficiency in the operation of the machines. This fact was brought out by **M. G. Talmadge** in speaking on "Elastic Properties of Steel Wire." Wire drawn continuously is inclined to be more uniform and consistant, the speaker asserted. Spring wire is tested practically every inch of its length whereas rope wire is tested only at each end. Advancements are being made, he explained, in high-speed equipment and in labor saving devices both of which puts an extra burden on the wire. A question was raised regarding the origin of wild wire. In the opinion of one wiremaker the steel manufacturer has not kept abreast of fabricating practice. Cost also is an important factor. If fabricators are willing to pay a premium for material they can effect large savings with the labor-saving equipment of today.

(Please turn to page 948)

GOVERNMENT WIRE PRODUCTION INFORMATION

Government Establishes Statistical Research Room

TO acquaint industry with the wealth of statistical information collected by the War Production Board and its predecessor agencies, the Civilian Production Administration will establish a statistical research room for a six-week period, November 19 through December 28, 1945. The exhibits will be open Monday through Friday of each week, from 9 a.m., to 5 p.m., in the Social Security Building, Washington, D. C.

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DURING the war government received from industry factual reports on such matters as production, materials consumption and inventories which were invaluable in planning production for military needs and for the civilian economy.

EXHIBITS will include some material which could not be published during the war for reasons of military security, or could not be made available previously because of the pressure of war work upon WPB's statistical staff.

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OFFICIALS emphasized that the material available for examination will not include any information relative to individual firms, because this information was given to the War Production Board on a confidential basis. Only summary facts will be presented.

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IN general, the material will be of four types: (1) blank copies of all application and report forms issued by WPB and its predecessor agencies, (2) copies of published tabulations drawn from these forms as returned by industry, (3) information indicating the extent to which other data have been tabulated but not published, and (4) estimates of statistical coverage on particular phases of industry.

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TO avoid overcrowding of the research room in the early part of its operation, persons intending to visit it between November 19 and 23 are asked to notify Mr. Albert A. Eisenstat, Chief, Industrial Statistics Branch, Civilian Production Administration, Washington 25, D. C., of such intention, and to name those operating units of WPB in whose statistics they are interested. Individuals who do not so notify Mr. Eisenstat by November 15, are requested to schedule their visits to the research room at some time after November 23.

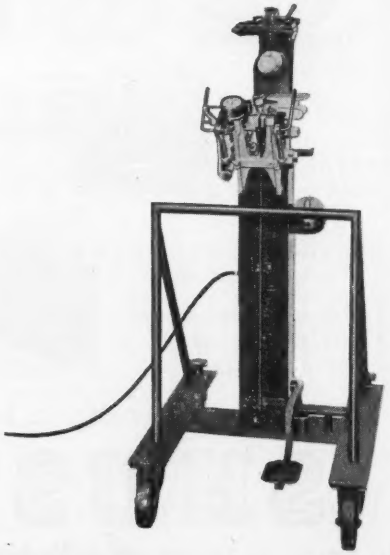
(Please turn to page 938)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY

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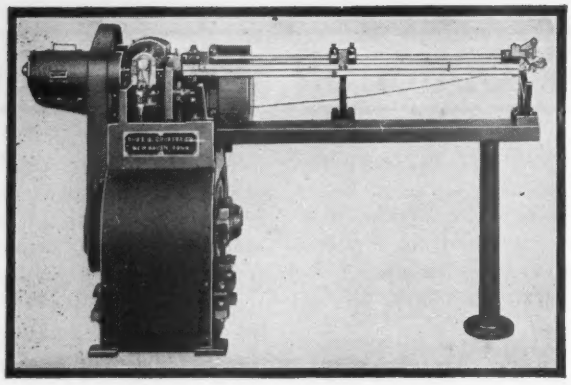
Telephone, State 7468



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Wire Capacity 1/32" - 1/16" Diameter

Faster Cutting Speeds
GREATER PRODUCTION!

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Outstanding Features—

Almost continuous wire travel
Lightning cut-off assures square-cut ends
High speed, direct driven 5-die straightening flier
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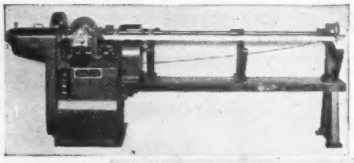
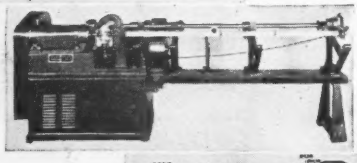
Descriptive folder on request



Type 1A
1/16" - 3/16"
Dia.



Type 2A
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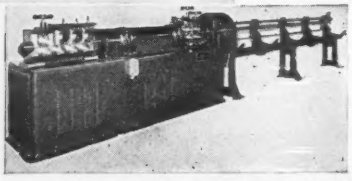

Type 3A
3/16" - 3/8" Dia.

Type 4A (not shown)
3/8" - 5/8" Dia.

The F. B. Shuster Mfg. Co., Inc., New Haven, Conn.

SHUSTER
Automatic
WIRE STRAIGHTENING
AND CUTTING
MACHINES
Since 1866

Government Wire Production Information

(Continued from page 937)

October Steel Production

OCTOBER steel production fell 700,000 to 950,000 tons below previous estimates, largely due to the coal strike, the War Production Board reported recently. This loss will require all manufacturers to reduce their immediate consumption of steel to insure an even distribution of the metal, WPB said. Ingot production for October was approximately 6,600,000 tons.

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REDUCED operations will continue to upset planned shipping schedules and will delay deliveries of urgently needed steel products which manufacturing companies, eager to produce much needed civilian goods, had on order. Accordingly, all manufacturers must face the fact that their steel receipts over the next 30 to 60 days will be below previous mill promises.

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WHEN the strike began, steel producers had very low coal inventories despite previous efforts to build up their stockpiles. As coal .65 carbon rod could well be too high shipments fell off materially, the steel companies were forced to bank blast furnaces and shut down open hearths because of the lack of fuel.

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STEEL producers reported to WPB that they dipped heavily into their stocks of cold iron and increased their charges of scrap into the open hearth furnaces in an effort to offset the reduced flow of hot iron caused by the banking of blast furnaces.

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ALTHOUGH coal is moving more freely since the termination of the strike it will require some time before coal reserves can be built up, WPB said.

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RECONVERSION demands have been building up very rapidly. Manufacturers of basic products have entered the market for very heavy tonnages of steel to be delivered promptly. This demand is exceptionally heavy, because it represents the need for re-pipelining as well as for current operations.

How To Improve Employee Discipline

ONLY one company out of five has a formal code of rules and regulations governing employee conduct on the job — and even fewer have any systematic procedure for dealing with infractions. This condition was brought to light in a recent survey by the Labor Relations Institute, which now prescribes the remedy via a special report to its members, entitled: "How To Improve Employee Discipline."

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SEVEN basic steps must be taken in order to insure lasting and equitable "tightening up" of discipline, according to this report. These steps, which are explained in detail in the text, may be summarized as follows:

1. **Set up written rules and regulations.**
2. **Make them reasonable.**
3. **Formalize the penalties.**
4. **Distinguish between major and minor offenses, so that punishment may fit the crime.**
5. **Publicize the rules to employees, foremen, and executives.**
6. **Use printed warning forms to notify offenders after each infraction. Keep a record of such warnings.**
7. **Train supervisors to investigate every situation thoroughly before imposing a penalty.**

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THIS advice is supplemented in the report with a series of charts and checklists. One, a four-page check-chart on infractions, names 38 separate violations, classifying each according to degree—major, minor, and intolerable — and gives the recommended penalty. Offensives range from reading on the job, a "minor" infraction, to drinking on the premises and immoral conduct. The latter are rated as "intolerable" and punishable by immediate discharge.

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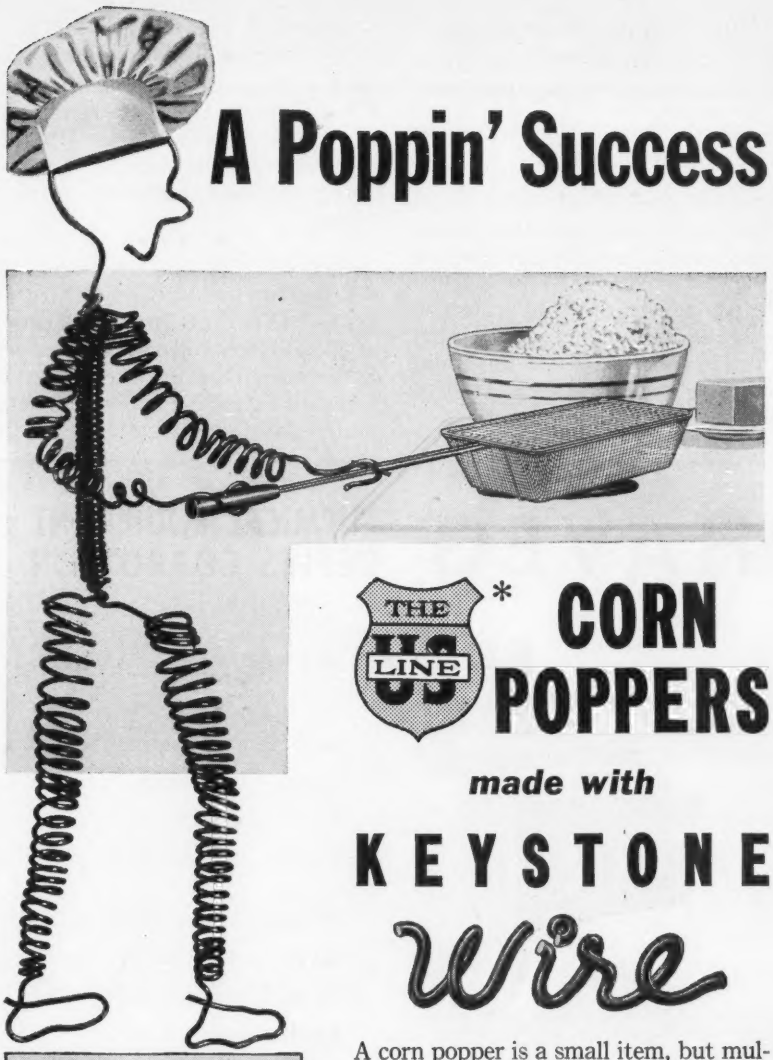
ANOTHER important feature of the report is the recommended warning form, which is reproduced in full detail for readers to copy or adapt. It contains all essential information for employee, supervisor and personnel department. The presentation of rules and regulations in the foreman's manual is also fully illustrated, along with a detailed list of questions which the supervisor

(Please turn to page 940)



THE U.S. LINE * CORN POPPERS made with KEYSTONE Wire

A corn popper is a small item, but multiply it by the hundreds of thousands produced by the U. S. Manufacturing Corporation each year, and it adds up to a lot of enjoyment in homes the country over.

Into U. S. corn poppers and fly swatters go hundreds of miles of Keystone wire. The U. S. Company finds, like so many other manufacturers, that for fabricating speed, uniformity and dependability, Keystone wire deserves first consideration.

We are indeed proud that the U. S. Corporation, a leader in its field, uses Keystone wire.

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KEYSTONE STEEL & WIRE CO.
PEORIA 7, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE

Coppered, Tinned, Annealed, Galvanized

How To Improve Employee Discipline

(Continued from page 939)

should ask himself when faced with an enforcement problem.

✦ ✦ ✦

THE union angle and the relation of discipline to collective bargaining are covered in the report, which tells management how to protect its prerogatives through proper wording of the contract provision governing company rules and their enforcement.

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Material Handling Society Formed In Pittsburgh

AT a dinner meeting held in the Roosevelt Hotel in Pittsburgh on Monday, October 8th, a group of men interested in material handling voted enthusiastically to form a society.

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A GROUP of objectives was suggested for the Society which included: 1. To further the application of good material handling practices; 2. To encourage an interchange of ideas among the members; 3. To promote education and training in the science and practice of practical coordinated material handling; 4. To arrange for the collection and dissemination of information relating to all phases of material handling.

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TEMPORARY officers elected were: Temporary Chairman, T. O. English, Aluminum Co. of America; Temporary Secretary, Richard Rimbach, Materials Publishing Company. The following committees were elected: Program Committee, Fred W. Bradley, National Adhesives Division of National Starch Products, Inc., Chairman; Martin A. Lyons, Westinghouse Electric Corp., and E. L. Niederhofer, Chemical Plants Division, Blaw-Knox Co., members. Constitution Committee, D. B. Hendryx, Harbison-Walker Refractories Co., Chairman; Louis E. Dietrich, P. Duff and Sons, and Jay Overpeck, J. H. Overpeck Co., members. Nominating Committee, F. Gordon Ricker, Yale & Towne Manufacturing Co., Chairman; Samson A. Huey, P. Duff and Sons, and James M. Phillips, Phillips Mine and Mill Supply Co., members. Membership Committee, Fred Benjamin, Kress Box Co., Chairman; O. Heidenreich, Elwell-Parker Electric Co., and J. L. Logan, Hagan Corp., members.

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IT was decided to hold the next meeting on Monday, November 19th, at which time the Program Committee hopes to be able to present something of interest to all the members and prospective members. Anyone interested in any branch of material handling is cordially invited to attend.

✦ ✦ ✦

FURTHER information may be obtained from the Temporary Secretary, Richard Rimbach, 1117 Wolfendale Street, Pittsburgh 12, Pa.

✦ ✦ ✦

Electronics Sorts Bearings Almost Identical in Size

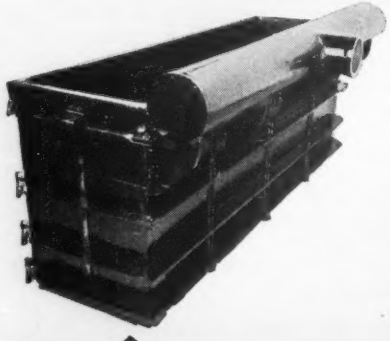
BALL bearings used in aircraft instruments and which do not vary in dimensions by more than 1/20,000th of an inch are sorted by an electronic gauge and dropped into tumblers with others of exactly the same size. As many as 10 different sizes are obtained, each group being separated from the other by no more than 10-millionths of an inch.

HAVEG CHEMICAL EQUIPMENT DEFIES CORROSION

HAVEG pickling tanks designed with fume removers

HAVEG tanks, piping, fume duct, valves, pumps, and other equipment may be used with acids . . . alkalis . . . solvents . . . even at boiling temperatures.

Permanent repairs to damaged equipment are readily and economically made by the user.



Piping and fume duct can be easily cut and fitted by plant maintenance shops.

Send for Bulletin F4, it gives complete data on construction details and chemical resistance.

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Outstanding Personalities of the Wire Industry

Leo B. McCoy Appointed Janitrol Representative In N. J. Territory

Leo B. McCoy has been appointed sales representative in the New Jersey territory for Janitrol gas-fired furnaces and burners, Surface Combustion Corporation, Toledo, Ohio, manufacturer of the equipment, announces.

✦ ✦ ✦

MR. McCoy formerly was with the Public Service Electric and Gas Co. as a heating and air conditioning sales representative in Passaic, Hackensack and Rutherford, N. J., joining that company following his honorable discharge from the Army in 1943. He is working out of the New York district offices of Surface Combustion in his new position.

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Thomas F. Davis, New York District Manager, Beryllium Corp. of Pennsylvania

MR. Thomas F. Davis has been appointed New York District Manager for the Beryllium Corporation of Pennsylvania with offices at 475 Fifth Avenue, New York 17, N. Y. Mr. Davis is a graduate of Brown University with a degree in chemical engineering, and has been employed for the past seven years by the General Electric Company, most recently as Chief Metallurgist at their Philadelphia Works. He is a member of the American Society for Metals, the American Institute of Mining and Metallurgical Engineers and the American Society for Testing Materials.

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MR. Davis has had considerable experience with the various steel alloys, magnetic nickels and the copper base alloys, and this, combined with his previous experience in working with beryllium-copper alloys will enable him to participate directly in metallurgical and engineering problems on applications of beryllium-copper.

Harold J. McKay Appointed Janitrol Service Engineer for New York

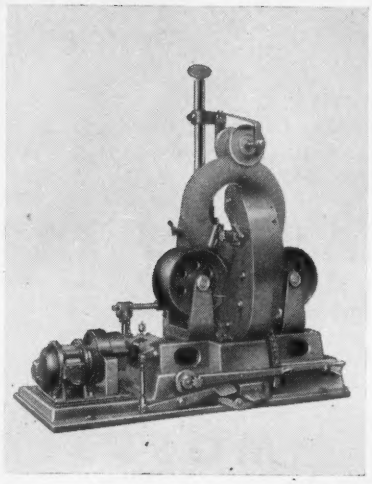
Harold J. McKay has been appointed service engineer in the New York district for Janitrol gas-fired space heating equipment, Surface Combustion Corporation, Toledo, Ohio, manufacturer of the equipment, announces.

HEADQUARTERS for Mr. McKay will be with Surface Combustion's New York district offices, Transportation Building, 225 Broadway. The new Janitrol engineer formerly was with the Brooklyn Union Gas Company.

(Please turn to page 942)

IS YOUR COIL WRAPPING A *Problem?*

If so, Angier of Framingham probably has the answer, having developed, over a long period of years, crinkled protective wraps for all kinds of wire and strip steel and the spiral wrapping machines to apply them.



Illustrated is one of several Angier machines, all of which are engineered for quick adjustment and easy control. Others, together with the right wraps for various types of coils, are fully described in our new booklet, *"The Better Way to Wrap Coils."* . . . Ask for it.

Angier **ANGIER CORPORATION**

• CORROSION PREVENTIVE AND WATERPROOF PAPERS •

FRAMINGHAM, MASSACHUSETTS

Outstanding Personalities of The Wire Industry

(Continued from page 941)

Howard Spencer Joins Salem Engineering Company

Howard Spencer has recently joined the Salem Engineering Company organization. Spencer, inventor of the Amsler-Morton Soaking Pit, is a steel mill furnace engineer of long experience. After attending Carnegie Tech., he became associated with Chapman Stein, Rust Engineering, Amsler-Morton, Loftus Engineering, and Spencer Furnace companies.

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L. R. Austin Appointed Wickwire Spencer Rope Distributor

Mr. L. R. Austin of Billings, Montana, has been appointed distributor for Wickwire Spencer Wire Rope in Montana, Wyoming and Idaho, according to an announcement by Mr. A. S. Rairden, Sales Manager, Wire Rope Division.

AUSTIN will stock inventories of Wickwire Spencer Wire Rope for the oil fields and other industries at Billings and Cut Bank, Montana, and at Casper, Wyoming. Stocks at these strategic points will enable Austin to offer immediate service on all requirements.

✦ ✦ ✦

HEADQUARTERS and main sales offices of L. R. Austin will be located at Billings.

✦ ✦ ✦

R. P. Tyler Elected to MacWhyte

AT a meeting of the Board of Directors at the company offices, October 12, 1945, **Mr. R. P. Tyler** was elected to fill a vacancy caused by the resignation of Mrs. George S. Whyte.

✦ ✦ ✦

MR. R. P. Tyler is also General Sales Manager of the company, which is engaged in manufacturing wire, wire rope, slings, and aircraft cable, terminals, and tie rods at Kenosha, Wisconsin.

David Alwood, Superintendent, Wire Drawing Division, Hanover Wire Cloth Co.

THE appointment of **David Alwood** as Superintendent of the Wire Drawing Division of the Hanover Wire Cloth Co., of Hanover, Pa., is announced. Mr. Alwood has been in the Woven Wire Division of the company for the past fifteen years.

✦ ✦ ✦

Standard Varnish Appoints Erb

THE appointment of **Mr. Charles E. Erb** as manager of Production Efficiency of Standard Varnish Co., is announced. Mr. Erb was formerly in the Engineering Dept. in charge of the development and adaptation of Corex and other types of resistant industrial finishes. In his new assignment Mr. Erb will have charge of coordinating the activities of the various plants to increase production, improve efficiency, cut production costs and especially to put in practice operations and utilize equipment

Patented

2 BX Mossberg Carrier

MOSSPEED BRAIDER CARRIERS

Represent

Improved Braiding at Lower Costs

The patented MOSSPEED spring tension take-up makes it possible to increase the speed of the maypole-type braiding machine. An effective increase of 80% being obtained in many cases.

The new (x) type MOSSPEED high speed carrier permits the rapid changing of tension springs making this an ideal carrier for braiding all kinds of yarn (cotton, rayon, asbestos, jute), in addition to fine strands of copper wire.

Consult our engineers regarding your braiding problems.

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Complete line of both MOSSPEED carriers and metal copholders for all sizes and makes of maypole type braiding machines.

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James Day (Machinery), Ltd., "Ford House," 88 Regent Street, London, W. I., England.

developed through war time demands. He will make his headquarters at the Chicago plant at 2600 Federal Street, Chicago, Illinois.

✦ ✦ ✦

Harry C. Dever Is Back With Copperweld Steel Co.

AFTER a three years' leave of absence, all of which was spent in the Armed Forces, **Harry C. Dever** is back with the Glassport, Pa., division of the Copperweld Steel Company. He will be in charge of the Atlanta office and cover the states of Georgia, Florida, South Carolina and North Carolina.

✦ ✦ ✦

HIS war record takes in 26 months of action in the Southwest Pacific, where he served as a Lieutenant in the Navy Civil Engineering Corps. Some of the major engagements in which his Construction Battalion saw activity were on Guadalcanal, Russell and New Georgia islands, as well as on Bougainville, Okinawa and the Admiralties.

✦ ✦ ✦

PRIOR to his war service, Lieut. Dever covered the Southeastern part of the United States for Copperweld. Before that, he spent many years as a transmission engineer in the power field. At one time he was associated with the Harza Engineering Company of Chicago, Ill.

✦ ✦ ✦

W. S. Rockwell Co. Announces New General Headquarters

TO consolidate the activities of the Rockwell Furnace Division, the Rockwell Valve Division and the Gehnrich Oven Division and to provide enlarged engineering and plant facilities and services, the general headquarters of **W. S. Rockwell Company** will be located at Fairfield, Conn., after November 1st, 1945. A New York Sales Engineering Office will be retained at the old address: 50 Church St., New York 7, N. Y., Room 955.

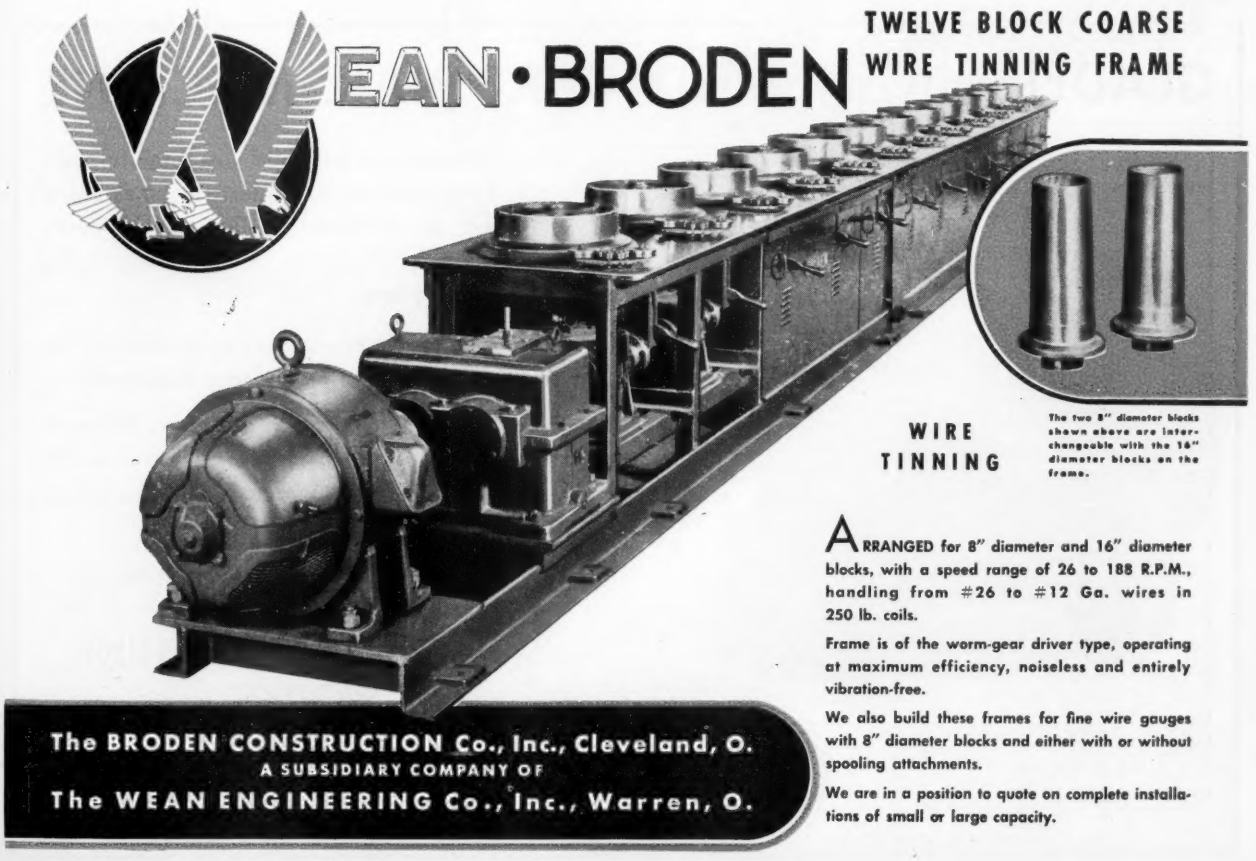
✦ ✦ ✦

Standard Varnish Appoints Landon Browne

Mr. **M. H. Corbin,** Vice President and Director of Sales of Standard Varnish Works, has announced the appointment of **Mr. Landon Browne** as Technical Sales representative in Upper New York State and Northwestern Pennsylvania.

✦ ✦ ✦

MR. Browne has been associated with the Standard Varnish Works as a Chemist in their laboratories for many years. His appointment is in accordance with the policy of the Company, thus enabling their representatives to contribute much technical advice and service to their customers which will be mutually advantageous.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TWELVE BLOCK COARSE WIRE TINNING FRAME
WIRE TINNING
The two 8" diameter blocks shown above are interchangeable with the 16" diameter blocks on the frame.
ARRANGED for 8" diameter and 16" diameter blocks, with a speed range of 26 to 188 R.P.M., handling from #26 to #12 Ga. wires in 250 lb. coils.
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The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.

A Review of Recent Wire Patents

No. 2,385,883, METHOD OF MAKING METAL PARTS FOR RING BINDERS, patented October 2, 1945 by John Schade, Holyoke, Mass., assignor to National Blank Book Company, Holyoke, Mass., a corporation of Mass.

✦ ✦ ✦

The method is adapted to the making of wire multi-prong and toggle-frame parts for ring binders.

✦ ✦ ✦

No. 2,385,973, APPARATUS FOR MAKING GRIDS, patented October 2, 1945 by William W. Eitel, San Bruno, and Jack A. McCullough, Millbrae, Calif., assignors to Eitel-McCullough, Inc., San Bruno, Calif., a corporation of California.

✦ ✦ ✦

A mandrel is provided for use in machines for the manufacture of cage-type wire grids.

✦ ✦ ✦

No. 2,386,466, INSULATED CONDUCTOR AND INSULATION THEREFOR, patented October 9, 1945 by James Franklin Hyde, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y., a corporation of New York.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

About the wire conductor is a dielectric material consisting of fabric impregnated with a resinous polymeric silicone. There are 20 claims.

✦ ✦ ✦

No. 2,386,634, FLEXIBLE ELECTRICAL INSULATING LAYER, patented October 9, 1945 by Preston Robinson, Williamstown, Mass., assignor to Sprague Electric Company, North Adams, Mass., a corporation of Mass.

✦ ✦ ✦

More specifically, the invention comprises the method of applying an insulating layer to the wire conductor by electrophosetically depositing the layer, from a suspension medium containing finely-divided refractory material (vitreous enamel) and an elastomer.

✦ ✦ ✦

No. 2,386,753, INSULATED ELECTRICAL CONDUCTOR AND CABLE, patented October 16, 1945 by John Shield, Valois, Quebec, Canada, assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

✦ ✦ ✦

The assembly comprises a central tinsel conductor, a layer of braided insulating material over the tinsel conductor, a layer of rubber insulation surrounding the layer of braided insulating material, a number of fine wires wound helically and in opposite directions about the rubber insulation, the number of the wires being such as to provide a predetermined degree of shielding of the insulated tinsel conductor.

✦ ✦ ✦

No. 2,387,191, APPARATUS FOR INSULATING ELECTRICAL CONDUCTORS, patented October 16, 1945 by Clyde N. Stover, Towson, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

✦ ✦ ✦

As the wire conductor is advanced, a knitting head knits a number of suitable textile strands together into a cone-shaped textile basket about the conductor and plastic insulating material is extruded into the basket and about the wire conductor to secure all together.

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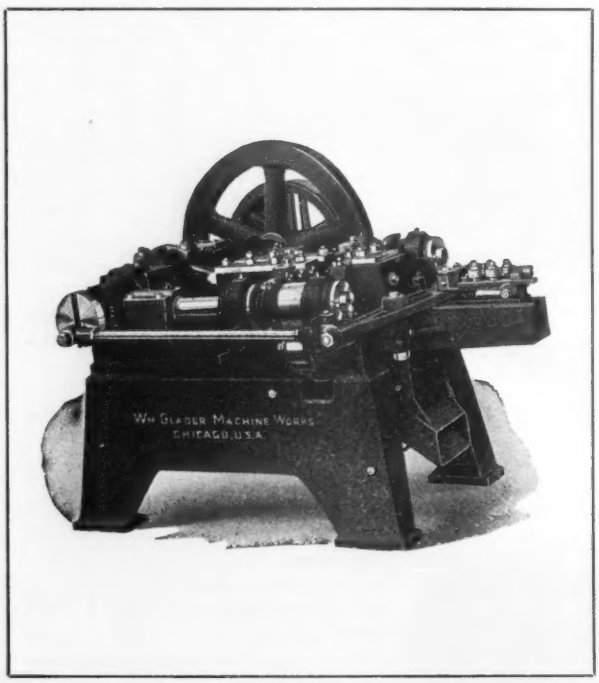

High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

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WM. GLADER MACHINE WORKS

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CHICAGO 7, ILLINOIS

No. 2,387,264, VEHICLE SPRING, patented October 23, 1945 by Cyrus J. Holland, Chicago, Ill., assignor to Holland Company, a corporation of Illinois.

✦ ✦ ✦

This spring has a uniform inside and outside diameters throughout its length and made from stock of uniform cross-section throughout its active length, the pitch of certain of the turns being greater than others and being such that the effective static deflection of the spring will be constant for variable loads with its load deflection curve conforming to the formula x-k loge y-c.

✦ ✦ ✦

No. 2,387,335, RUBBER ADHERENT WIRE, patented October 23, 1945 by Willaim E. Leonard, Worcester, Mass., assignor to The American Steel and Wire Company of New Jersey, a corporation of New Jersey.

✦ ✦ ✦

Iron wire is etched by acid to provide a somewhat irregular surface, exposed to the air in order that the acid clinging to the surface, and the air will complete the etching, the wire is then treated by an aqueous alkaline solution, washed. a metallic coating chemically deposited and rubber applied.

✦ ✦ ✦

No. 2,387,498, COATED ARTICLE, patented October 23, 1945 by Thomas K. Cox, Randallstown, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

✦ ✦ ✦

Wire conductors are coated with a rubber antioxidant much as butvraldehyde-aniline condensation product together with a mixture of about 35% diphenyl-para-phenylene and about 65% phenyl-alpha-napthyla-mine, a covering of vulcanizable rubber insulating compound is then applied and vulcanized.

✦ ✦ ✦

No. 2,387,720, SELF-THREADING SCREW, patented October 30, 1945 by Frank L. Davis, College Point, Long Island, N. Y.

✦ ✦ ✦

This screw has a longitudinal eccentrically disposed hole in the entering end of the same and located completely within the body of the screw, there being a slot cut through the screw tangentially into the eccentrically disposed hole to provide a tangential planing edge.

✦ ✦ ✦

No. 2,387,829, ELECTRICAL APPARATUS, patented October 30, 1945 by John Burnham, North Adams, and James L. Hyde, Williamstown. Mass., assignors to Sprague Electric Company. North Adams, Mass., a corporation of Mass.

✦ ✦ ✦

More specifically this patent covers a flexible antenna for use in locations where ice is apt to deposit thereon. A flexible wire constitutes the core, with a surrounding heat-resistant, dielectric thereabout, a flexible, deformable de-aerated metal sheath about the last, and conducting wires about the sheath and partly imbedded therein.

✦ ✦ ✦

No. 2,388,106, METHOD AND APPARATUS FOR MAKING SPRING ASSEMBLIES, patented October 30, 1945 by Edward E. Weller, Kenosha, Wisc., assignor to Simons Company, a corporation of Delaware.

✦ ✦ ✦

The assembly includes a device for holding, in predetermined position, a pair of rows of springs with predetermined coils of the springs of one row in juxtaposed relation to predetermined coils of the springs of the other row, for feeding a wire helix endwise and rotating the same, a guide for guiding the helix so as to cause the coils thereof to encircle the juxtaposed coil portions, and apparatus for flattening a turn of this helix adjacent certain of the juxtaposed coil portions to lock the helix against rotation and removal from the coil portions.

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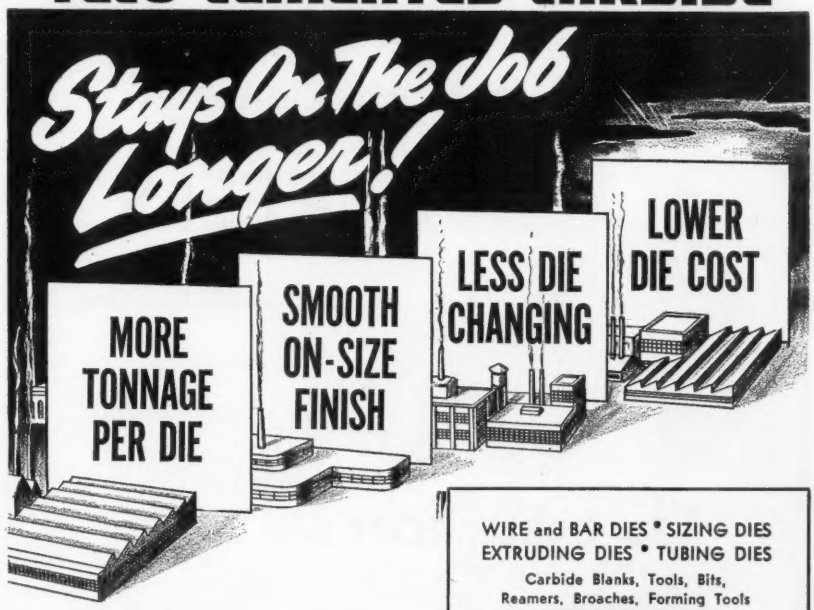

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Technical Discussions at the Convention

(Continued from page 936)

IMPORTANCE of the reduction of area in the evaluation of high-carbon steel wire for cold drawing purposes was stressed by **B. L. McCarthy,** chief metallurgist, and **D. A. Sutch,** metallurgist, Wickwire Spencer Steel Co., Buffalo. Mr. McCarthy in presenting the paper pointed out that the essential features of good heat treating practices common to the general heat treatment of steel apply in the patenting process in same manner as any other important heat-treating problem. The essential features are:

1. **Complete solution of intermetallic compounds.**
2. **Development of a uniform austenite.**
3. **Controlled precipitation of the carbides.**

✦ ✦ ✦

IN suggesting a means of evaluating the material in regards to these three requirements the author stated that within reasonable limits and with due consideration to the amount of carbon in the material, the reduction of area value can be used as a direct indication of the austenitic grain size resulting from the patenting treatment. This austenitic grain size is in itself a means of indicating the presence of complete solution of the intermetallic compounds because in the absence of complete solution, the austenitic grain will not grow to any definite size. The presence of a certain austenitic grain size can be used as a direct indication of the type of precipitation of the carbides, he contended. This is based on the fact that a direct relationship exists between the austenitic grain size and the reaction rate.

✦ ✦ ✦

THE authors believe the reduction of area value can be used as a full indication of thorough patenting and that the tensile values obtained by making the reduction of area tests can have a definite significance.

✦ ✦ ✦

EXPERIENCE has shown, Mr. McCarthy continued, that for a given analysis and a given rod or wire section, that the tensile will mount as the time at temperature is increased up to a certain point and will remain constant from that point on. This tensile value, which is stable over a wide range of patenting temperatures and time at temperature, is the one ideal tensile value which we have under consideration. Any attempt to patent to any appreciable lower value must be done at the expense of good heat treatment and will result in an inferior quality in the wire.

✦ ✦ ✦

THE authors concluded that the increase in grain size resulting from patenting and indicated by the reduction of area values may well influence the final ductility of the wire. It bears out the slip interference theory that coarse grains produce less interference to slip than fine grains.

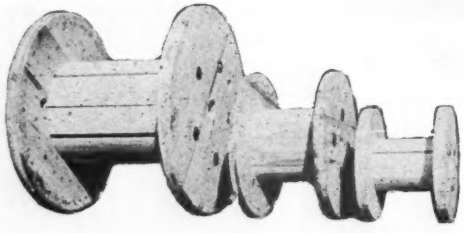
✦ ✦ ✦

LEAD patenting because of the fact that the quench characteristics are different than in the case of air patenting, can be employed to produce any desired tensile providing this desired tensile is in excess of the normal tensile resulting from air patenting.

✦ ✦ ✦

J. **H. Loux,** Engineer, Salem Engineering Co., Salem, O., in speaking on "Annealing High-Carbon Stock" stressed the importance of the surface condition of the wire before entering the furnace. It is im-

WOODEN . . . REELS



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possible, he warned, to anneal free from decarb a wire covered with rusty water. He recommended giving the wire an alkali dip before placing it in the furnace. If this practice becomes standard, he stated, occasional losses of material would be prevented.

✦ ✦ ✦

STUDY is being given to the possibility of changing the spheroidizing cycle in some manner so as to reduce the overall cycle time, the author declared. Indications are that if the heating-up time is reduced drastically the soaking time will have to be increased accordingly. In the author's opinion interesting alterations in the spheroidizing cycles for all types of steel will undoubtedly be developed within the next year.

✦ ✦ ✦

THE Herman process, a comparatively new way of applying zinc to carbon steel wire was described by Rowland Hussey, Superintendent Wire Department, Jones & Laughlin Steel Corp., Aliquippa, Pa. He pointed out that all methods of applying molten zinc to wire differ little, if any, in the galvanizing line to the point where the wires actually emerge from the spelter bath. In coating type III galvanized wire by the Herman process, a machine covers an area of the spelter bath at outgoing end — an area larger than usually is found in floating a bed of charcoal.

✦ ✦ ✦

THE Herman machine is an auxiliary spelter tank partly submerged in the bath of the main kettle. Its bottom plate has a slot for all the wires to pass upward. Plates are welded around the slot on the inside of the tank to form a riser through which spelter will flow when put in motion. This riser called a nozzle is about 10 in. high. The auxiliary tank, therefore, can contain a bath of spelter in itself.

✦ ✦ ✦

IN the rear end plate of the tank, an outlet duct is provided: two motor-driven impellers cause the spelter to flow from the auxiliary tank to main bath.

✦ ✦ ✦

IMMEDIATELY above the outgoing slot in the auxiliary tank, a nozzle directs a solid stream of clear water across or at right angle to the plane of travel of the galvanized wires. Opposite this nozzle, a roll is placed to hold the upgoing wires steady and in a fixed position relative to both upperslot and the nozzle in the bottom of the auxiliary tank.

✦ ✦ ✦

IN the enclosed space, not filled with zinc means are provided for introducing natural gas to prevent an oxidizing atmosphere, and thus keep the galvanized wires bright and clean while the zinc is solidifying and to the point where they can be quenched by water.

✦ ✦ ✦

THE outgoing end sinker roll turns continuously and smoothly for long periods while immersed in the molten zinc. The roll journals are cased in Stellite metal deposited by electric welding; the bearings are blocks of carbon similar to carbon brushes on motors.

✦ ✦ ✦

AFTER the wires being galvanized leave the sinker roll and turn upward they pass through the nozzle in the bottom of the machine. Flowing upward through the nozzle at the same time continuously is a stream of molten zinc, kept in steady

(Please turn to page 948)

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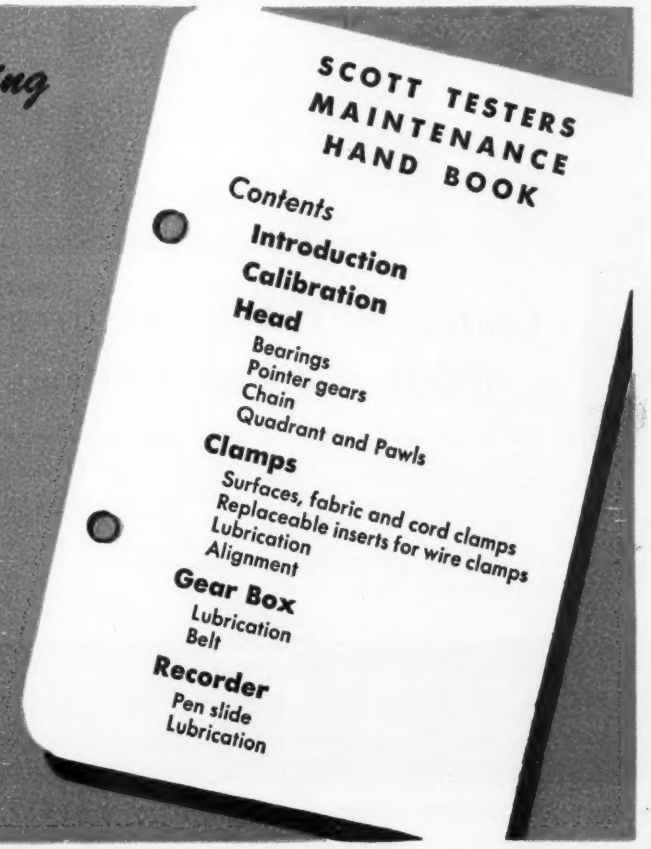

Technical Discussions at the Convention

(Continued from page 947)

circulation by the motor-driven impellers. The circulating stream of molten zinc is rather shallow compared to total depth of main kettle so that the supply of zinc in the final stage of galvanizing the wires is well above any dross line and the stream of molten zinc is so widely dispersed on being expelled from the machine, that newly formed dross has space in which to settle and not be included in the return flow to the nozzle stream.

THE speaker in referring to galvanized rope wire produced by the Herman process mentioned that the tensiles are well up in the specified range for all rope grades, torsional values are maintained well above the specified minimum, coatings are uniform, smooth, lustrous, and resist abrasion well.

✦ ✦ ✦

GALVANIZED wire made by this process is readily drawn to diameter corresponding to 95 per cent reduction in area, with speeds in some of the finer sizes of 2000 fpm. Wrap tests made on drawn-down galvanized stock show no surface peeling, but rather a hard, dense surface of high luster.

✦ ✦ ✦

PRODUCTION rates normally obtained are slightly higher than those experienced with the charcoal process and the zinc carry-off is no greater on comparable size. At normal operating speeds, the ratio of alloy layers to the pure zinc content of Herman galvanized stock is so balanced that the theoretical Preece test, coating weight relationship is maintained, that is, 0.18-oz. of zinc per sq. ft. of surface is equivalent to one minute dip.

✦ ✦ ✦

MR. Hussey in relating how the strands are threaded through the Herman machine pointed out that in starting off a frame, the 36 wires are put down through a slot and around the sinker roll and then hitched to a bar welded on the back of the machine. The wires are in place before the machine is put into the spelter tank and when the operator wants to start operations he puts thin wires on both ends and pulls them through.

✦ ✦ ✦

THE machine can be readily removed by the use of hoisting rigging and a spare unit set in place. From time to time, the speaker asserted, we are compelled to remove a machine particularly if the bearings should go bad.

✦ ✦ ✦

MR. Hussey mentioned that there is probably less dross coming from these wires but a little more from the walls of the main kettle because of its larger size. In order to process 36 wires simultaneously, he explained, it is necessary to use a wider tank because of the journals and bearings at each end of the machine. On the usual range of size, the tank is 41 in. deep and because of its width it is necessary to have sufficient wall space in order to get heat to these tanks.

✦ ✦ ✦

A CHANGE in speed controls the weight of coating on 12-gage wire. The practice is to put on a coating up to 1½ oz. The speaker did not recommend going down below 0.6 or 0.7 oz. One company which

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has a Herman installation tried propane gas but was obliged to abandon its use because under its high temperature considerable coating was removed from the base metal. City gas is not satisfactory; coke oven gas is used. The consensus of opinion is that natural gas gives the best results. The life of the kettle is around 10,000 tons maximum according to current practice.

✦ ✦ ✦

UP to 100 years ago no pickling of wire was done, **Kenneth Lewis,** Consulting Wire Mill Engineer, Worcester, Mass., stated in opening the Wednesday morning session. Wire originally was cleaned by scratching off the scale with old bricks and the lubricant had to get hold of the surface as best it could. The draft was light and the wire of small diameter. It was not until fine wire came upon the scene that attention was paid to the surface, the speaker stated. There was no market for coarse wire; the pieces were short. Lime was used for the first cover though not for the purpose of neutralizing acid. The use of acid began to creep in about 1850. Pickling was accomplished by rolling the material in tumbling barrels containing sand and water. The bundles called faggots weighed approximately 14 lbs. Each man, the speaker pointed out, had his own lime tub and his own mixture. The faggots were hung on a peg on the wall and were baked by the hot sun. In the speaker's opinion, lime has its place but in the wire mill it is only there until something better can be found. At least seven new techniques for the improvement of surface preparation are being investigated by the wire industry it was announced.

✦ ✦ ✦

H. **L. Trembicki,** Manager, Metro Coating Division, Magnus Chemical Co., Cleveland, in speaking on "Preparing Rod Surfaces for Drawing" alluded to the progress made in coating on regular production basis during the past three years. A few plants, he stated, were able to run 100 per cent with special coating compounds. The most successful type of coating is a compound with low alkalinity and with wetting properties. However, he emphasized, it must not be hydroscopic. It is possible today, the speaker contended, to coat wire, ship it to other plants without rusting and then draw it seven holes on a high-speed machine. New coating processes eliminate baking without any danger of hydrogen embrittlement.

✦ ✦ ✦

HOT air blast is the best method of drying fine wire of any moisture. If too much heat is used, the speaker warned, it produces a hard coating on the wire.

(Please turn to page 950)

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IN ADDITION

— THE MORDICA MEMORIAL LECTURE FOR 1945 —

By John C. Callaghan,
Works Manager, Canada Works,
Steel Company of Canada, Ltd., Hamilton, Ontario, Canada

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Technical Discussions at the Convention

(Continued from page 949)

A CLEAN surface is one of the prime requisites in the efficient use of coating compounds. The wire rod is pickled in acid and then washed in cold water to remove any trace of acid. It is then dipped in the coating solution contained in a welded steel tank which is heated by enclosed steel coils. The temperature of the solution is maintained at 200° F. and the concentration kept up by regular testing methods. High-carbon wire is left in the solution for a period of 3 minutes. When lifting the pin of wire out of the solution it is held for a few seconds to take care of the drip. The coating provides an excellent rust prevention and can be stored and drawn any time thereafter.

✦ ✦ ✦

BETTER die life on high-speed machines is afforded by the use of coatings, Mr. Trembicki stated. A comparison of a machine on lime and one on coating for a period of 2 to 3 month operation discloses that the die life handling the coated stock was three times as long as afforded by limed wire. The importance of using a good lubricant along with the coating was emphasized. Particularly did the speaker stress the importance of using a lean lubricant in the first die box only. If lubricant is used in other boxes, he stated, it will actually remove the coating compounds. When low-carbon wire is being processed, say No. 5 rod, properly coated, the procedure includes placing lean lubricant in the ripper box, draw four drafts, remove, and draw four more holes on a single block machine with no lubrication. Again the speaker pointed out that the finish depends on the lubricant used in the first die box. Wires drawn with coating compounds are easily cleaned and will take subsequent coatings with ease. The speaker contended that there is a definite improvement in the quality of welding wire that has been drawn with compounds, tire bead wire and rope wire get a perfect bond and wire to be drawn with liquor finish is much better.

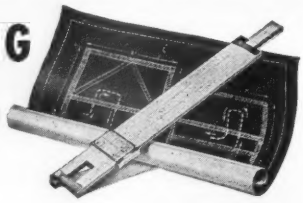
✦ ✦ ✦

IN discussing Mr. Trembicki's paper one wiremaker stated that in his opinion lime still has its place. The best results, he maintained, of coatings are not yet obtained because specification lubricants must be developed and must go hand-in-hand with the coatings. It was also stated that the lubricant must have a gritty feel and not one that slips through the fingers.

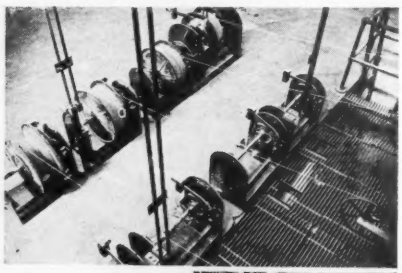
✦ ✦ ✦

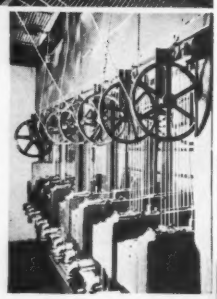
PHOSPHATE coatings work well with lime, another speaker contended. One of the advantages of its use is that it does not attack the base metal. If phosphate acid is employed you get the chemical action with the wire. The usual practice is followed before placing the cleaned wire in the lime tubs. By the use of phosphate coating good die life is secured and a larger number of drafts obtained than when using lime coatings. Another speaker stated that most every navy yard in this country is now equipped with pickling,

OVEN ENGINEERING NEWS



IOE Cable Lacquering Systems Set New Efficiency Standards For Insulated Wire Industry





Above — Here are the controlled-tension payoff stands for an eight-end wire and cable lacquering system which was designed, built and installed by the Industrial Oven Engineering Company. Lacquer pots are shown at right.

THE lacquering equipment shown here, installed in the plant of a large Eastern wire manufacturer, can finish up to 600,000 lineal feet of medium sized wire and cable per eight-hour shift, including saturating, lacquering and baking, in a single continuous automatic process. The wire produced has greatly improved surface gloss, cross sectional accuracy and dielectric strength.

Such **IOE** systems are easy and economical to operate. The combination of simple, tension-controlled payoff stands, readily accessible lacquer and saturation pots, and **IOE** high-speed constant-tension windup machines, enables one man to handle an eight-end operation without difficulty.

Get the Whole Story—Write today for a detailed description of the basic **IOE** cable lacquering system.

Below—The eight windup machines corresponding with the payoffs in the photograph left above. These constant-tension, variable-speed units draw the wire through the entire system, winding it onto reels after lacquering and drying.

(This is No. 22 of a series. Reprints of previous advertisements sent free upon request.)

IOE ENGINEERING VERSATILITY

THE INDUSTRIAL *Oven Engineering* COMPANY

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wash and phosphoric acid tanks. In rebuttal to what had been claimed for coating compounds another speaker mentioned that lime still is cheap, it counteracts rust and provides a good bond for lubricants. Improvements in drawing compound come from removing the fuzz on the surface of the wire. These little particles weld under pressure and it is this welding that is responsible for undue die wear. If the coating process is on the acid side this fuzz will be removed thus reducing die wear and affording an efficient coating of copper.

✦ ✦ ✦

A MANUFACTURER of coatings stated that chemicals can be developed for cleaning and coating wire but unless it is tried on the mill in proper tonnages little information can be secured. Development of coating compounds have lagged because this has not been done, the speaker contended. He recommended close collaboration between mills and producers of coatings.

✦ ✦ ✦

INCREASED use of beryllium-copper wire is attributed to the production of suitable wire bars according to **M. J. Donachie,** Technical Director, Beryllium Corp., of Pennsylvania, Reading, Pa. He warned that certain characteristics of the alloy must be controlled in all redraw operations if wire is to be produced economically on a quality basis.

✦ ✦ ✦

MR. **Donachie** drew attention to a fine red powder layer formation of corroded metal which plugs the dies. This, he stated, is readily removed by suitable pickling practice and when the metal is properly cleaned, the resultant wire can be drawn either wet or dry without difficulty. He recommended soaking the bundle in the following composition: Sulphuric acid, one part by volume; water, four parts; to each gallon of solution add 4 oz. of sodium dichromate. Its temperature should be maintained between 140 and 160° F. He recommended holding the bundle in the bath until a uniform soft brown sludge is formed, after which it is removed, water rinsed and struck in a bright dip of nitric acid; (1.42 sp. gr) and water in equal parts.

✦ ✦ ✦

IN discussing the annealing of beryllium-copper the speaker stated that atmospheres developed from cracked gas at a ratio of 2.0 air to 1 gas to 3.0 air to 1 gas when dried to minus 20° F. will prevent formation of intergranular nature in annealing. Softening at annealing temperatures from 1450 to 1475° F. followed by a quench are required to restore the alloy to a suitable working condition, the speaker contended.

✦ ✦ ✦

SALT baths have been used in annealing beryllium copper, he stated, but in practice have not been successful because of the rapid corrosion attack of the salt at high temperatures.

✦ ✦ ✦

S. **C. Avallone,** Metallurgist, Spencer Wire Co., W. Brookfield, Mass., in a written discussion agreed

(Please turn to page 952)

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Edmund D. Sickels, Advertising Manager

Technical Discussions at the Convention

(Continued from page 951)

with Mr. Donachie that in temperature straightened wire tensiles of 220,000 psi are readily available. However, it cannot always be readily used at the high-tensile value because of local or spot brittleness. Mr. Avallone pointed out that the wire will shape or coil over a large radius, or about four times the wire diameter, but in sharp angular forms or crimping application he recommended tempering back to tensile strength limits between 165,000 and 195,000 psi, depending on the size and end use. This, he explained, reduces the brittle tendencies in the local areas.

✦ ✦ ✦

IN the opinion of **J. Ogden,** Little Falls Alloys, Inc., Paterson, N. J., bath annealing and quenching of beryllium copper wire does not permit uniform rates of quench, but result in variables in the age-hardening fabricated parts. The possibility of variations in temperature and quench rates is eliminated by the use of constant speed strand annealing, he explained.

✦ ✦ ✦

STRAND annealing wires, 0.036 to 0.005-in. diameter are now being made on a commercial basis to produce a minimum strength after hardening of 300,000 psi.

✦ ✦ ✦

INCREASED die life is afforded by plating the wire before drawing, Mr. Ogden stated. It also prevents the wire from becoming oxidized. He explained that oxidized wire cannot be plated satisfactory. Therefore, any wire that has been plated and then drawn through a number of dies, maintaining a sound adherent coating must be free of surface oxidation and intergranular corrosion.

✦ ✦ ✦

H. **S. Freynik,** Chief Metallurgist, Riverside Metal Co., Riverside, N. J., in a written discussion claimed that considerable trouble could be expected from the use of the pickling solutions recommended by Mr. Donachie. The hot oxidizing solution in the proportions mentioned has a faster dissolving rate on the metallic beryllium copper than on its oxides, he contended. Consequently, since the surface oxidation is not uniform, the solution will cause severe surface pits in sections first exposed by the oxide solution.

✦ ✦ ✦

THE practice, he explained, has been to pickle in a solution of 1.1 sulphuric acid — water at 170° F. This dissolves most of the surface oxidation but has little effect on the alloy itself. The wire then is finish cleaned by a short immersion in a solution composed of one part by volume of sulphuric acid, nine parts water, and about 5 oz. sodium dichromate to a gallon of solution. This finishing solution is used at room temperature.

✦ ✦ ✦

MR. Freynik in conclusion stated that the surface condition of beryllium copper wire has the greatest influence upon drawing. Next in

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WIRE, TUBING, STAMPING
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This compound in your cleaning house will remove acid and annealing smut, on all carbon and alloy wire, giving a uniformly clean finish

Back of the "STEELSKIN" TRADEMARK is a thirty-five-year period of experience in the development and manufacture of soaps and compounds for dry and wet drawing of all types of ferrous and non-ferrous wire.

OUR ENGINEERS WILL BE GLAD TO COOPERATE WITH YOU IN FINDING THE MOST ECONOMICAL AND EFFICIENT SOLUTION TO YOUR DRAWING PROBLEMS.

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importance is the beryllium content of the alloy. When the beryllium content exceeds 2.05 per cent large quantities of excess beryllium usually are segregated in the form of stringers, and he warned that this phase is extremely hard on drawing dies. In addition, he stated, the structure of this wire promotes rapid work hardening and brittleness in drawn condition.

✦ ✦ ✦

AT the final morning session, **C. J. Shopmyer,** Works Laboratory, General Electric Company, Schenectady, N. Y., presented details of a machine employed for measuring wire stiffness by low stress elongation which is applicable for both large, round and rectangular wire. A sample about 16 in. long is straightened and marked with a bar having two knife edges exactly 10 in. apart. The sample is then placed in a tensile testing machine and loaded to a value of 1500 psi. for 30 seconds. After the load is removed, he continued, a new set of marks is made with the 10-in. bar. By means of a shop microscope, having a scale graduated in mils it is possible to measure the possible elongation or low stress elongation.

✦ ✦ ✦

THE proper load on wires of any shape is readily found by cutting a piece of wire 10.28 in. long. The weight of this in grams is the load in pounds necessary to give a stress of 1500 psi. multiplied by 10. In conclusion the author pointed out that the test has been useful in several ways. It provides a figure for softness which can be used in specifications and which is independent of wire sizes. It is a useful tool for determining the effectiveness of annealing procedures and the hardening effect of various combinations of bending and stretching. It also affords an effective method for determining the suitability of wire for certain difficult winding jobs.

✦ ✦ ✦

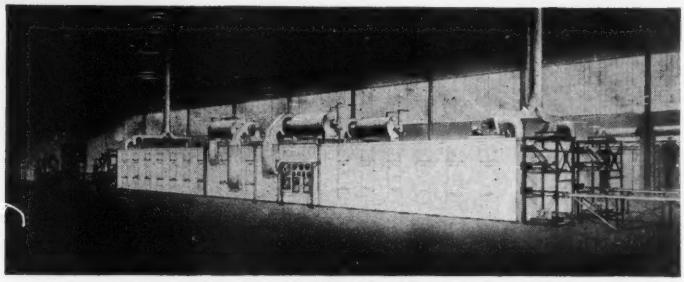
DISCUSSION brought out the fact that the results obtained from this machine are reproductive by different operators. The machine has been used since 1939 and has

(Please turn to page 954)

MORE PRODUCTION IN LESS TIME with CARL-MAYER FURNACES, OVENS

CARL-MAYER HI-SPEED
ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



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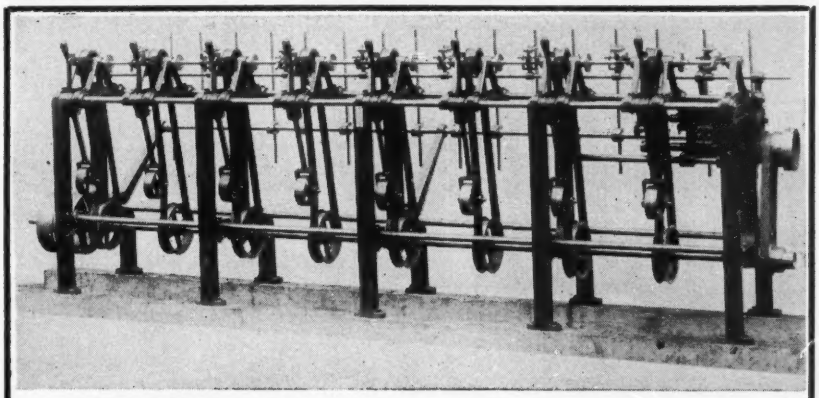

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Model illustrated takes spools up to 12" diameter. Floor space required: 19" x 10'; length can be varied to suit largest spool specified. Handles wire up to .050" diameter. Other models made to suit specific requirements.

EMORY SPOOLERS are built for years of continuous service. Precision made, durable, rugged, dependable.

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Entirely new development in wire coating that gives better than two to three times the rust resistance of tin. Smooth, satin finish that acts as a lubricant, reducing tool wear. Will not flake or peel. Used successfully where extreme acid or gasoline fume conditions exist. Coating does not affect physical properties. Solders better than tin.
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PINGREE 5702

Technical Discussions at the Convention

(Continued from page 953)

been found helpful in determining what customers require in the way of soft wire and in all sizes. Then, too, the speaker mentioned various rods are tested as received from manufacturers in order to determine if the product is suitable for magnet wire.

✦ ✦ ✦

E. P. Hall, Metallurgist, Kennecott Wire & Cable Co., Phillipsdale, R. I., in discussing this paper pointed out that any method of testing to be satisfactory should comply with certain conditions. These he stated, are as follows:

1. **Measure that property of wire which is essential to coil winding.**
2. **Reproducible by different operators.**
3. **Easily and quickly made.**
4. **Apparatus should be inexpensive.**

✦ ✦ ✦

DATA gathered from various sources would indicate that the L.S.E. test, within the capacity of the apparatus described, would meet conditions 1, 2 and 3 and should receive serious consideration as a method of testing class 2 wires. Its relative high cost would probably restrict its use to the larger laboratories, Mr. Hall stated.

✦ ✦ ✦

Nine Per Cent Nickel Steel Now Available for Tubing

A NEW application of the recently developed 9% nickel steel in tubing designed especially for subzero temperatures was announced here today at **The Babcock and Wilcox Tube Company,** manufacturers of the new product. This is the first time that this high nickel-bearing steel has been made available in tubular form.

✦ ✦ ✦

DEVELOPED primarily to answer the pressure tubing needs of plants handling liquified gases or other low temperature fluids, the new nickel steel tubing exhibits good physical properties even at temperatures as low as minus 320 degrees F. (minus 196 C.)

ACCORDING to **H. D. Newell,** Chief Metallurgist and Director of the Tube Company's laboratory, the new product may be applied in low temperature work as a substitute for 18-8 stainless steel tubing, and it will have particular applications in oil refineries and the chemical industries. It is also probable that it can be used for special pump tubing in oil wells where salt water and hydrogen sulphide in the oil fluid present a difficult corrosion problem. Other applications are in the tubes for black liquor evaporation (in the preparation of waste black liquor for burning in the Kraft paper industry), for caustic solution evaporation, and for alkaline-phenol solution work.

✦ ✦ ✦

THE new 9% nickel steel tubing is capable of giving Charpy impact values as high as 25 foot pounds, even at the minus 320 F. temperature. The new alloy will offer resistance to attack by alkaline media and to low temperature embrittlement to a greater degree than any other nickel alloy steel tubing regularly produced by the company.

✦ ✦ ✦

DEVELOPMENT work in connection with the piercing, rolling and drawing of the new alloy steel has been satisfactorily completed. Finished normalized tubing shows very satisfactory physical properties and withstands the usual deformation tests on flattening, flanging and crushing. Minimum tensile properties of the tubing are specified as follows: ultimate strength, 80,000 psi; yield strength, 50,000 psi; and elongation, 20% in 2 inches. The use of electric furnace steel only is recommended with nickel content ranging from 3 to 10% and carbon held to 0.12% maximum. The steel should be a fine grained type, irrespective of the end use.

✦ ✦ ✦

Nukem Silicate Cement

THE Nukem Products Corporation of Buffalo 20, New York, has just released a booklet describing their new product, "Nukem Silicate Cement." This cement is an unusually tough acid-resisting cement with a wide application for joining brick or tile work for chemical plants, steel mills, etc.

"Standard" Rolling Mills assure high production hot or cold rolling of your strip, rod or ingot. Speeds are provided for rolling metals in any range from 10 feet to 500 feet per minute, depending upon your needs. Two, Three, or Four High Mills are available with roll sizes from 1½" diameter and 1" face to 16½" diameter and 18" face.

"Standard" manufactures special units for grading, cross and pinch rolling, forming wire to exact dimensions, and for a large variety of shaping operations.

Catalog section RM and detailed recommendations will be sent upon request.

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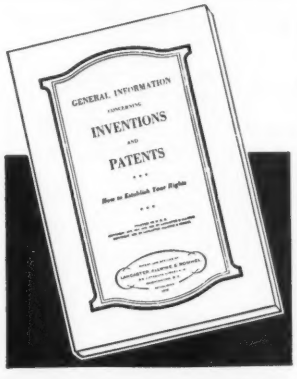

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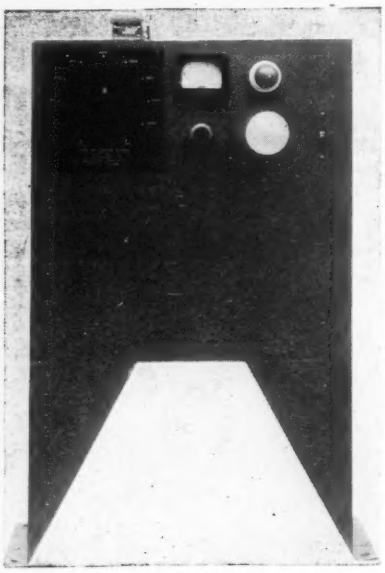

THIS APPARATUS WILL LOCATE DIELECTRIC FAULTS while the wire is being insulated. When breakdown occurs, the operator is notified by an audible alarm. A resettable counter gives the number of faults in each reel. By sorting out the defective reels in this operation, the majority of the resparking is eliminated. Continuous range of voltage at the electrode is from one thousand to sixteen thousand volts. The sparker is equipped with voltmeter reading in kilovolts, and automatic interlock with the take-up motor.

R. L. Davis Electric Co.

Wallingford, Conn.

New Book Entitled: "Tested Claused for Union Contracts"

A SELECTIVE collection of 115 union contract clauses, designed to aid employers in negotiating agreements with labor unions, has been released by the Labor Relations Institute in the form of a special report to its members. The clauses were sifted from thousands of current provisions, and were chosen by the Institute's own staff of negotiators. In making their choice, the experts were guided by two main standards — first, workability; second, the protection of management prerogatives.

✦ ✦ ✦

THE report covers all principal points covered in a typical contract negotiation, but is not confined solely to the wording of approved provisions. In each instance, management is supplied with arguments and counter-proposals which will help mould a well rounded agreement. For example, each of the 23 provisions on seniority is accompanied by background and "what-to-do" information which shows why each particular clause is recommended to fit a given situation.

✦ ✦ ✦

THE completeness of the guide is indicated by the following list of topics covered: Recognition, Union Security, Management prerogatives, Grievance procedure, Discharge, Seniority, Layoffs, Transfers, Promotions, Wage stabilization and Union activities.

✦ ✦ ✦

IN addition the report gives detailed advice—as well as contract clauses—on such management prerogatives as: authority over conditions of employment; the right to promote employees to supervisory positions; to determine production processes; to control efficiency methods; to set new rates for new jobs; to distribute work among employees, departments and agents and the right to move, reduce or change the plant.

✦ ✦ ✦

COLLECTIVE bargaining is always a give-and-take procedure, the editors point out in their preface to the report, with the comment that "most employers know this, but the misapplication of WHAT to give and WHAT to take can cause trouble aplenty in union-management relations."

✦ ✦ ✦

"THE employer who makes unwise concessions to union demands will soon find himself fenced in by a contract that bodes no good for either side. On the other hand, the executive who is too unyielding in his bargaining, may win only low morale, slow-downs and suspicion from the union and its members. Both situations can have their negative effect on the company's financial balance sheet."

✦ ✦ ✦

"BY having a choice of clauses at your disposal, you will be in a better position to give a little here and take a little there, and thereby reach that middle ground which is the real goal of any union negotiation."

✦ ✦ ✦

THIS book is the third of a series of special reports on collective bargaining techniques. It is published by the Labor Relation's Institute, 1776 Broadway, New York 19, N. Y., and sells for $2.25 per copy.

✦ ✦ ✦

New Alloy Finish For Wire

A NEW alloy finish of wire has been announced by **Johnson Steel & Wire Company, Inc.,** of Worcester, Massachusetts. It is the successful application of zinc which this company has developed during the war. It is claimed to give two to three times the rust resistance of tin with a finish that acts as a lubricant. This coating does not affect the physical properties of the wire, and, being zinc, solders better than tin.

✦ ✦ ✦

IT has been used successfully where extreme acid or gas fumes are prevalent. This new coating on which there are no restrictions, say the manufacturers, will combat the tin shortage.

Science of Process Control

THE development of emergence of automatic processing control in its present status as an exact science is explained simply and instructively in a new book, The Principles of Industrial Process Control.

✦ ✦ ✦

WRITTEN by Donald P. Eckman, engineer of Brown Instrument Company, industrial division of Minneapolis-Honeywell Regulator Company, the book is the first of its kind to be published concerning the overall basic fundamentals of the science of automatic industrial control. For the first time it puts between two covers all the technical and practical information about the new science which grew so rapidly during the war and which will play an even more important role in the years ahead, when efficient and economical production techniques will be counted upon to offset rising labor and raw material costs and high taxes.

✦ ✦ ✦

PRINCIPLES of Industrial Process Control, published by John Wiley & Sons, Inc., New York, explains automatic control, measurement and process in a language that is understandable to the student and worker and valuable as a guide and reference for the processor and his technicians.

✦ ✦ ✦

SUBJECTS covered include: Measuring means of industrial controllers, characteristics of measuring means, modes of automatic control, final control elements, process characteristics theory of automatic control, quality of automatic control, application of control engineering, automatic control systems, maintenance of exact control. The volume ends with a glossary of 126 terms and definitions. It also provides 119 references.

✦ ✦ ✦

Oakite 1945 Victory Conferences

HIGHLIGHTING each of the 1945 Victory Conferences of the Oakite organization, held in New York and Chicago during October, was an exchange of technical information on cleaning, descaling, derusting, degreasing and related operations, particularly as applied to peacetime manufacture of civilian products. In addition to the entire field forces of more than 140 Oakite Technical Service Representatives, these conferences were attended by the staffs of the Mechanical Engineering, Chemical and Research Laboratories of Oakite Products, Inc.

✦ ✦ ✦

THE various discussions were devoted to the determination of the most effective techniques for performing post war production and maintenance cleaning operations on a time-saving, low-cost basis. Among the many subjects covered were the war-developed Oakite CrysCoat Process for providing tenacious paint adhesion to ferrous metal surfaces; preparation of aluminum and aluminum alloys for spot welding, Alroking, anodizing and other industrial finishes; surface preparation of basis metals before electroplating; use of Oakite materials in cutting, grinding, drawing, stamping, burnishing, tumbling, etc., and other important subjects.

✦ ✦ ✦

OF particular interest was the announcement of the newly-developed Oakite-Vapor Cleaning Unit, which will soon be available to industry. Capable of generating steam pressure up to 200 lbs. within 1 to 2 minutes after starting from cold, this unit discharges 60 to 90 gallons of steam cleaning solution per hour at the desired steam pressure up to 200 lbs. Continuous operation of two steam guns at the same time is possible with this unit. The information exchanged at the Oakite Victory Conferences is available to those interested through the Oakite Technical Field Service Staff, 22 Thames St., New York 6, N. Y.

✦ ✦ ✦

American Chain & Cable Co. Expands Plant to Increase Chain Link Fence Output

THE Chain Link Fence Department, Page Steel and Wire Division, American Chain & Cable Company, Monessen, Pa., has announced an improvement program calling for expenditure of about $350,000 for plant additions. The new facilities will increase the company's capacity to about 600 tons of chain link fence per month, it was stated.

Warner

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"Diamond and Gem Stone Industrial Production"
by
PAUL GRODZINSKI
PRICE $5.00

The use of diamonds and gem stones as dies for fine wire drawing, and of diamonds for cutting tools, is comparatively recent. Today it is extensive and increasing. In this book the author has brought together all the data and information available on the subject and has added the results of his own experience and research. Although dealing mainly with the actual production of the dies and tools, the knowledge this book imparts is of prime importance to tool users. Efficiency and economy in the use of diamond and gem stone dies and tools is not possible without a knowledge of production methods.

There are reference tables and a large number of specially drawn illustrations included in this book. An endeavor has been made to leave no phase of the subject untouched.

✦ ✦ ✦

These books are imported from England and we are unable to carry a large stock, so

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There is no time like the present!

Now that you are back on the job making paper clips, staples, hooks and products of a similar nature, it might not be a bad idea to check up on some of Oakite's war-born cleaning materials and techniques and use them to help speed up your peace-time production.

If you've a problem on preparing wire surfaces for plating, galvanizing, enameling, lacquering or a similar finishing operation the chances are that we can come up with a material . . . suggest an efficient cleaning cycle that will help provide you with low-cost, trouble-free production. Your inquiry will receive prompt attention. Write TODAY!

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Carboloy Co. Asks Court To Determine Veterans' Job Rights

DETROIT . . . What is believed to be the first declaratory judgment action taken to determine the relative validity of Union and Selective Service interpretations of the Federal act governing re-employment of veterans was filed in Federal Court here on October 23rd, by the Carboloy Company, Inc.

✦ ✦ ✦

ACCORDING to Selective Service, the Act "compels" the company to re-employ a returned veteran. Unions generally are in conflict with this law in that they claim the eligibility of the veteran should be governed by his "seniority" status. In Union contracts with management, "seniority" generally dates from the end of the employee's probationary period after he was hired.

✦ ✦ ✦

THIS difference in opinion, which has been plaguing Industry ever since passage of the act, was brought to a head here by the action of the Carboloy Company in asking for a Federal Court ruling on the question.

✦ ✦ ✦

THE issue involved in the "test" case is that preference was given a returned veteran over a woman employee who had both been hired originally, for similar work in January of 1943—the woman one day earlier than the man. Subsequently the man, Floyd J. Vailliencourt, left to enter military service. On his discharge from service last December, he was re-employed by the Carboloy Company.

✦ ✦ ✦

LATER, when war contract cancellations made layoffs necessary at the Carboloy plant, the Company laid off the woman, Mrs. Nellie L. Iannucci, retaining the veteran—in line with the Selective Service interpretation of the act.

✦ ✦ ✦

RECENTLY, the Union (UAW-CIO) has notified the company that according to its contract Mrs. Iannucci was laid off "illegally"—that the veteran should have been laid off, and that the company was

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✦ ✦ ✦

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Kenneth B. Lewis

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✦ ✦ ✦

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liable for back pay to Mrs. Iannucci. The Company, officials say, had gone through the entire war period without a strike, manufacturing literally millions of cemented carbide cutting tools for war industries and armor-piercing cores of this same hardest of metals for anti-tank projectiles.

✦ ✦ ✦

ITS harmonious relations with the Union are now being threatened according to company officials, by the varying interpretations of the Veterans' Act, and it has asked the Court to determine what its course should be. The seriousness of the problem to the Company is emphasized by the fact that its former employees still in the service and who in all likelihood will request re-employment, represent a total equal to 70 percent of its entire present payroll.

✦ ✦ ✦

SIMILAR problems are being faced by countless other manufacturing organizations throughout the country, Carboloy officials state, and might result in serious and widespread labor disturbances, as veterans are rehired in increasing numbers, unless a definite court ruling on the question is issued.

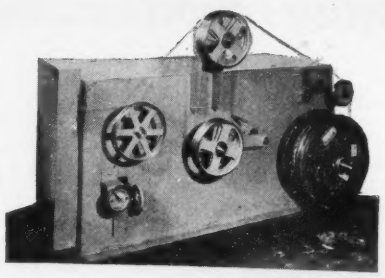
✦ ✦ ✦

Federal Releases New Book on Gaging!

A new book, "Over 7,000 Ways to Control Dimensions", has been released by Federal Products Corporation, Providence, Rhode Island. This book is designed for desk or pocket use and contains 52 pages, listing well over 100 representative Dial Indicating Gages which meet practically every inspection need involving dimensional control.

✦ ✦ ✦

THERE are practical Dial Indicator Gage setups for Angle, Compressibility, Concentricity, Curvature, Depth, Height, Inside and Outside Diameters, Length, Location, Squareness, Thickness, Threads, Width and also various combinations of dimensions. Federal Air and Electronic Gages are also described in detail, and the company offers to send a free copy of the book if requested on official letterhead.



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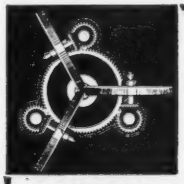

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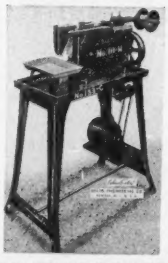

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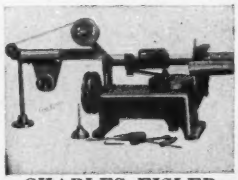

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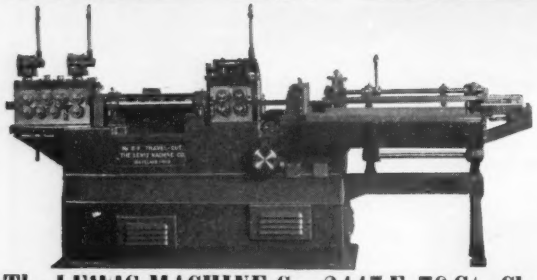

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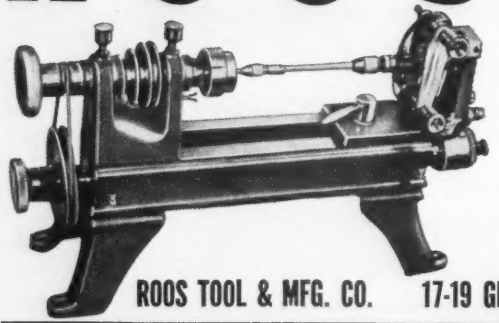

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New Pickling and Descaling Process Announced

CULMINATING years of laboratory research and mill experience, the Du Pont Company announces a sodium hydride process for descaling metals, an alkaline pickling bath which requires no electric current.

✦ ✦ ✦

THE process is said to have advantages over the usual acid pickling for alloy steels and particularly for stainless steels. The scale, reduced by the sodium hydride dissolved in fused caustic, virtually is blasted from the surface of the metal by the generation of steam in a subsequent water quench. Only a few seconds dip in acid to brighten the surface remains to be done.

✦ ✦ ✦

THE sodium hydride bath is effective on such metals as nickel, cobalt, and copper as well as on alloy and stainless steels.

NINE advantages of the process have been tabulated from experience. They are:

1. The bath, containing active sodium hydride, penetrates throughout the work and uniformly descales all surfaces;
2. All grades of alloy steels can be descaled and different grades can be descaled interchangeably using the same procedure;
3. There is no loss of metal; usually 2 to 3 per cent is lost in other pickling processes;
4. No harm can result from too long treatment; the hydride bath will not pit the work;
5. Since the bath does not attack metal at its working temperature, an ordinary low carbon steel tank can be used;
6. No electric current is necessary;
7. The working temperature of 700° F. is sufficiently low that there is no deleterious effect on the structure of the metal;
8. The hydride bath does not produce hydrogen embrittlement of the steel;
9. Savings in time, space, and disposal of waste residue are important items.

✦ ✦ ✦

SODIUM hydride dissolves in molten caustic and the solution reduces iron oxide to metallic iron. The sodium hydride reacts with the scale to form caustic soda, which is the material comprising the bath itself. The reaction:

$$Fe_3O_4 + 4NaH = 3Fe + 4NaOH$$

✦ ✦ ✦

THUS, no undesirable impurities are added to the bath and the metal walls of the tank are not attacked.

✦ ✦ ✦

UNTIL now, extension of the process has been restricted because of the critical war need for sodium, particularly in the manufacture of tetraethyl lead for aviation gasoline. The easing of war restrictions makes the process immediately available for general use in the United States free of license or royalty.

✦ ✦ ✦

Balloffet Resumes Imports of Diamond Dies

THE Balloffet Dies and Nozzle Company, Inc. have resumed the importation of Diamond Dies from their French parent organization, the Societe des Filieres Balloffet of Langieu, France. At the same time the American Company will continue the manufacture of dies in its Guttenberg plant.

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Herty Elected President of Metals Society

Dr. Charles H. Herty, Jr., of Bethlehem, Pa., was elected national president of the American Society for Metals at the annual meeting recently at the Cleveland Club.

✦ ✦ ✦

As president of the Society during the past year, Dr. Kent R. Van Horn, Assistant Manager, Cleveland Research Division, Aluminum Company of America, Cleveland, presided during the annual meeting which was held in conjunction with the regular meeting of the Cleveland Chapter of the Society.

✦ ✦ ✦

Other officers elected were A. L. Boegehold, head of the metallurgy department, Research Laboratories Division, General Motors Corporation, Detroit, vice president; Dr. H. K. Work, manager of research and development, Jones & Laughlin Steel Corp., Pittsburgh, treasurer; John Chipman, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., and W. E. Jominy, chief metallurgist, Dodge Chicago Plant, Chrysler Corporation, Chicago, trustees.

✦ ✦ ✦

Dr. Herty was born in Athens, Georgia, October 6, 1896, and after preparatory schooling at Asheville, attended the University of North Carolina where he graduated in 1918 with a B.S. degree in Chemical Engineering.

✦ ✦ ✦

During 1918 and 1919 he was engaged in the Chemical Warfare Service of the U. S. and in 1924 received the degree, Doctor of Science, from Massachusetts Institute of Technology. After serving as physical chemist with the U. S. Bureau of Mines, Pittsburgh, from 1926 to 1931, Dr. Herty became director of research, Metallurgical Advisory Board, Pittsburgh. Joining the Bethlehem Steel Company in 1934 as research engineer, Dr. Herty was appointed assistant to vice president in 1942. The recipient of the Albert Sauveur Achievement Award in 1943, Dr. Herty is the author of numerous articles on the melting and refining of steel.

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The Importance of the Reduction of Area in the Evaluation of High Carbon Steel Wire For Cold Drawing Purposes.

(Continued from page 925)

ture increases. The reason for this is that the grain growth continues and with it a lowering of the reduction of area value. This makes possible the use of the reduction of area value as a means of further evaluation of the patented material and the development of greater ductility in the finished wire.

✦ ✦ ✦

IN Fig. 6 is shown a table of values showing the effect of the reduction of area on the patented material and its influence on the final reduction of area of the wire.

✦ ✦ ✦

SAMPLES 1, 2 and 3, as listed in the table, are all taken from steel containing .68 carbon and .74 manganese. Table 1 shows the increase on drawing of .120 gauge wire patented to reduction of area of 32%, while table 2 shows the results obtained in the same material patented at 40%. Table 3 shows the results obtained in the same material patented at 50%. You will note that a lower reduction of area has resulted in higher ductility and that the material patented to a 50% reduction of area showed no rise in the reduction of area. This could be used as an indication of improper patenting.

✦ ✦ ✦

IN Fig. 7 is shown results of drawing a #5 rod, .60 carbon, .85 manganese, patented to two different reduction of areas. While in this case the rise in the reduction of area is not as great as in Fig. 6, the same tendencies are apparent. Also, the higher patented reduction of area values resulted in lower final results in the wire.

✦ ✦ ✦

FROM the above the conclusion may well be drawn that the increase in grain size resulting from patenting and indicated by the reduction of area values may well influence the final ductility of the wire and bears out the slip interference theory that coarse grains produce less interference to slip than fine grains.

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THE use of the simple determinations of tensile and reduction of area may be used as an indication of air patenting quality when used with certain reservations as regard desired values for various carbon contents. For example, a value of 52% on a .65 carbon rod could well be too high for quality patenting. The same value, however, if obtained on a .48 carbon stock might produce good results. This approach is pretty much up to the individual operator and no fixed rule can be laid down for it.

✦ ✦ ✦

IN summing up, therefore, the following conclusions may readily be drawn from the data presented; that the reduction of area value, because of the fact that it will indicate austenitic grain size and degree of fineness of the pearlite, is a valuable tool in the evaluation of air patented material as to its suitability for the manufacture of quality wire. That the air patenting treatment can, by the use of reduction of area value, be brought to the point of perfection and that only a tensile value in line with the highest tensile available in the air cooled condition is a desirable tensile for the manufacture of quality wire. Also, that the reduction of area in the as-patented condition can be employed as a control of the final ductility of the wire after drawing.

✦ ✦ ✦

FURTHER, that lead patenting, because of the fact that the quench characteristics are different than in the case of air patenting, can be employed to produce any desired tensile providing this desired tensile is in excess of the normal tensile resulting from air patenting.

✦ ✦ ✦

Steel Stools

STEEL stools, available in five heights and 80 models, which have a diversity of industrial and commercial uses, are now being marketed by **Lyon Metal Products, Inc.**, Aurora, Ill., it is announced.

✦ ✦ ✦

THE 80 models, the company asserts, which have been designed from a physiological standpoint to meet every posture need in busy plants, aid materially in increasing employee efficiency by reducing fatigue.

✦ ✦ ✦

THE 26″ stool, No. 1226, is equipped with an adjustable back and pressed wood seat (over steel) and steel feet. The back support may be attached to all models.

✦ ✦ ✦

Executives' Analysis of Material Handling in New Tructractor Handbook

CRYSTALLIZING the basic principals of modern mechanized Material Handling, a new Tructractor booklet entitled "Clark Carloader Method" approaches the subject analytically, from the points of view of top management, purchasing agents, production engineers, sales managers and transportation executives.

✦ ✦ ✦

FOR the executive who plans to integrate mechanized Material Handling as an essential phase of planned production, this 4 x 7″ book will prove helpful and interesting.

✦ ✦ ✦

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An Appraisal of the General Business Outlook

(Continued from page 934)

including Germany. It is fairly apparent that that part of the German steel industry which has not been destroyed will be rigidly controlled. Germany will have nothing left with which to rebuild her heavy industries. Anything that is done along this line will be with the cooperation and consent of the Allies. It isn't likely that Germany will be permitted to become much of a factor in world steel markets.

✦ ✦ ✦

IT is interesting to note that the French, Belgian and Czech steel industries have been spared, though all have been producing for our enemies. The bombing of the Skoda Works at Pilsen in Czecho-Slovakia was primarily to destroy the heavy ordnance works. A steel plant as such at that location probably would not have been touched.

✦ ✦ ✦

THE Japanese steel industry is scheduled for the same fate as the German, as well as her other heavy industries.

✦ ✦ ✦

RUSSIA, being nearly self-sufficient, is expected to devote many years after the war to rebuilding her shattered cities. She will also complete the movement of key industries east of the Urals, so she never again can be crippled by a sudden invasion from the West. Having learned by bitter experience what an inadequate rail and highway system can mean to a nation at war, Russia is expected to begin the building of a great rail and highway network and develop Siberia intensively. This will require continued industrial growth in Russia, but will also consume all the steel Russia can produce for many years to come. Our people expect Russia to be a large customer rather than a serious competitor in world steel markets.

✦ ✦ ✦

THIS then leaves England and the United States to supply an enormously expanded world demand for steel, not only as raw material, but in machine tools, motors, industrial equipment, railroad facilities and agricultural implements. Britain has

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a total capacity of 16 million tons. We have 100 million tons. If this thinking is correct, export markets will absorb a far higher proportion of our steel output than they have ever done in the past.

✦ ✦ ✦

Conclusion

I CAN almost hear some of you people thinking, "Why worry about export markets when you can't take care of the demand here at home?" I must admit that the steel industry of this country is in a terrific jam. We thought early in the year that when the two wars ended we would drop back to about 60% operations. Quite the opposite has been true. We have dropped back, but it has been due to manpower shortages and labor disturbances in the coal fields and elsewhere, not to lack of orders.

✦ ✦ ✦

Republic is booked on most product lines into the middle of next year and in some cases beyond. We are obliged to allocate our output much as the War Production Board did during the war and we're not making anyone very happy. How long it will take to fill up the pipelines and relieve some of the pressure I can't even guess, but in the meantime all we can do is to distribute our output as fairly and equitably as possible.

✦ ✦ ✦

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✦ ✦ ✦

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WHERE TO BUY

For more complete information, consult the annual Wire and Wire Products Directory, Index & Buyers' Guide.

ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

ACID-PROOF CONSTRUCTION—
Ceilcote Co., The, Cleveland, Ohio
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio
Nukem Products Co., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ALKALINE CLEANERS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

ANNEALING MACHINES—
Open Flame
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

BELTS—Wire
Wickwire Spencer Steel Co., New York, N. Y.

BENDERS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BOBBINS—Braider & Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BRICKS—Acid Proof
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Co., Buffalo, N. Y.

CABLE LACQUERING OVENS
Industrial Oven Engr. Co., Cleveland, Ohio.

CABLE—Steel and Copper
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Williamsport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York, N.Y.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

CEMENTS—Acid Proof
Sauereisen Cements Co., Pittsburgh, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIP.
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Haveg Corporation, Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Nukem Products Corp., Buffalo, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

CLOTH TESTERS—
Scott Testers, Inc., Providence, R. I.

CLOTH—WIRE, All Metals
Roebling's, John A. Sons, Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Shell Oil Co., Inc., New York, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Shell Oil Co., Inc., New York, N. Y.
Standard Industrial Compounds, Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Shell Oil Co., Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.

DIAMOND POWDERS—
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
United Die Co., Newark, N. J.

DIAMOND TOOLS—
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
United Die Co., Newark, N. J.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Co., Detroit, Mich.
New England Wire Die Co., Worcester, Mass.
New Jersey Carbide Die Co., Jersey City 4, N. J.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Michigan Wire Die Co., Detroit, Mich.
New Jersey Carbide Die Co., Jersey City 4, N. J.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
New Jersey Carbide Die Co., Jersey City 4, N. J.
Rusch Wire Die Corp., New York, N. Y.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Works, Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING & PRE-HEATING ROOMS
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

DRYING EQUIPMENT
Carl-Mayer Corp., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

ENGINEERS—Consulting Wire Mill
Aufhauser Brothers Co., New York 5, N. Y.
Lewis, Kenneth B., Worcester, Mass.
Wiel, L. D., New York, N Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCES AND FENCING—Wire
Wickwire Spencer Steel Co., New York, N.Y.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, Ohio.

WHERE TO BUY, Continued

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Galvanizing Equipment
Electric Furnace Co., Salem, Ohio
Furnace Engineers, Inc., Pittsburgh, Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corporation, Toledo, O.
Wilson, Lee, Engineering Corp., Cleveland, Ohio

FURNACES—Hard'ing & Temp'ing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corporation, Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Furnace Engineers, Inc., Pittsburgh, Pa.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Galvanizing Equipment
Furnace Engineers, Inc., Pittsburgh, Pa.
Wilson, Lee, Engr. Co., Cleveland, Ohio

GALVANIZING KETTLES
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, Ohio.

INSULATING MATERIALS—
Angier Sales Corp., Framingham Mass.
Cheney Brothers, New York, N. Y.
Crepe-Kraft Co., Newark, N. J.
Du Pont de Nemours, E. I., & Co., Wilmington, Delaware
Standard Varnish Works, Staten Island, N. Y.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LIME—
Warner Co., Philadelphia and Bellefonte, Pa.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Buck, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Coil Wrapping
Angier Sales Corp., Framingham, Mass.

MACHINERY— Coilers
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Phila., Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Carboloy Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Oven Engineering Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Fence
Broden Construction Co., Cleveland, Ohio
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark 3, N. J.

MACHINERY—Flat Wire
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY— Forming
Eisler Engineering Co., Newark 3, N. J.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

WHERE TO BUY, Continued

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co, Torrington, Conn.

MACHINERY—Welding Wire
Aufhauser Brothers Co., New York 5, N. Y.
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY — Wind-up (Constant Tension, Variable Speed
Industrial Oven Engr. Co., Cleveland, Ohio.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark 3, N. J.
Nilson, A. H., Co., Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co, Torrington, Conn.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Shell Oil Co., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Dehydrogenizing
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Industrial
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Corrosion Preventive
Angier Sales Corp., Framingham, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER—Insulating
Angier Sales Corp., Framingham, Mass.
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Ceilcote, The, Co., Cleveland, Ohio
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, Ohio.

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.
Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

WHERE TO BUY, Continued

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, O.
Moslo Machinery Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Stevens Metal Products Co., Niles, Ohio.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Wooden
Bridge Mfg. Co., Inc., The, Hazardville, Conn.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N. Y.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Heil Engineering Co., Cleveland, Ohio
Standard Industrial Compounds Co., Chicago, Ill.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, Ohio.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Shell Oil Co., Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, Ohio.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hayward, R. B., Co., Chicago, Ill.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPRINGS—Steel
Wickwire Spencer Steel Co., New York, N. Y.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Williamsport, Pa.
Wickwire Spencer Steel Co., New York, N. Y.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N.Y.

STRIP METAL TESTERS—
Scott Testers, Inc., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Compound
Haveg Corp., Newark, Del.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
National Annealing Box Co., Washington, Pa.

TESTING INSTRUMENTS—
Davis, R. L., Electric Co., Wallingford, Conn.
Scott Testers, Inc., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TRAVERSES—
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio

TREADS—Safety
Norton Co., Worcester, Mass.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES—For Insulation
Standard Varnish Works, Staten Island, N.Y.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Philadelphia, Pa.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Oven Engr. Co., Cleveland, Ohio.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Music
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.

WIRE—Non-Ferrous to Specification for Special Purposes
Hudson Wire Co., Ossining, N. Y.
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Johnson Steel & Wire Co., Inc., Worcester 1, Mass.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARNS & TAPES—
Cheney Brothers, New York, N. Y.
Du Pont de Nemours, E. I., & Co., Wilmington, Delaware

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

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The WATSON MACHINE COMPANY
ESTABLISHED 1845
PATERSON, NEW JERSEY, U. S. A.

Wire & Wire Products
December, 1945

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

CONTINUOUS "Dead Reel" LET-OFF

For ductile materials where residual torsion has no deleterious effect on product, these units make possible CONTINUOUS PROCESS UNREELING FROM SPOOLS and are companion equipment to our Continuous Takeups.

OPERATION.

Two reels with starting and finish ends connected, are located on turn-table reel-center pins. The flyer with a brake, adjustable during run, provides uniform product tension during reel run-down. As the unwinding reel, located under the flyer empties, foot pedal pressure releases the turn-table-lock and the full reel swings into position under the flyer and locks there while unreeling continues without interruption. The empty reel is removed, replaced by a full reel, the ends again connected and the performance cycle repeated.

CONSTRUCTION.

Welded-Steel "take-down" Frame facilitates shipping or storage. Anti-friction Bearings throughout. Pressure Lubrication. Rigid and light-weight Chrome-Molybdenum Steel Flyer. Curved Tunsten-Carbide Guides (Patent Pending).

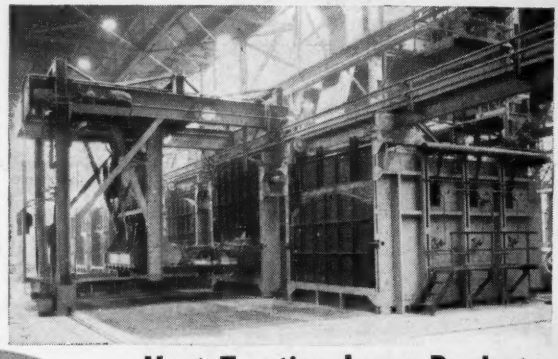
SIZES.

Cut shows a unit designed for 24" and smaller reels. Other sizes available.

EF FURNACES

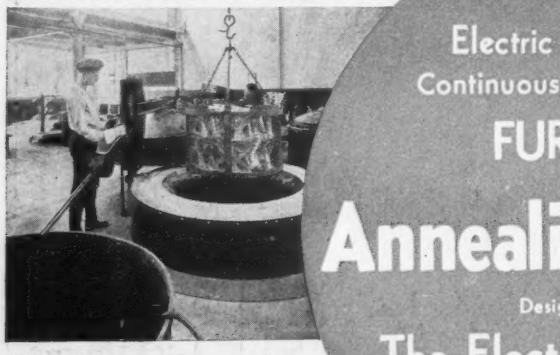
For Every Industrial Heat Treating Process

Continuous Scale Free Annealing
40,000 lbs. of castings per day are annealed, scale-free, in the above EF continuous special atmosphere short cycle annealing installation.

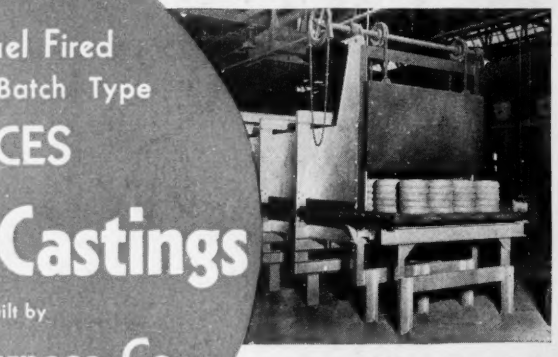


Heat Treating Large Products
Railroad castings, heavy tank castings and other large parts and products are annealed or heated and quenched in EF furnaces similar to above.

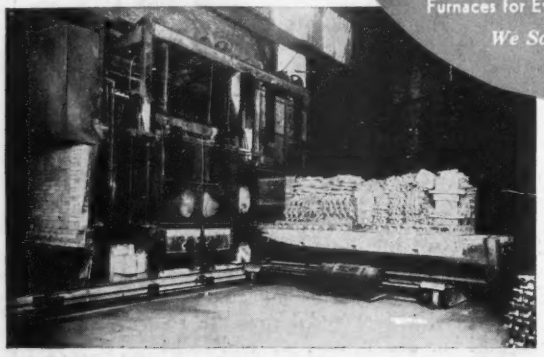
A Few
Electric and Fuel Fired
Continuous and Batch Type
FURNACES
FOR
Annealing Castings
Designed and Built by
The Electric Furnace Co.
Salem, Ohio
Furnaces for Every Industrial Heating Process
We Solicit Your Inquiries



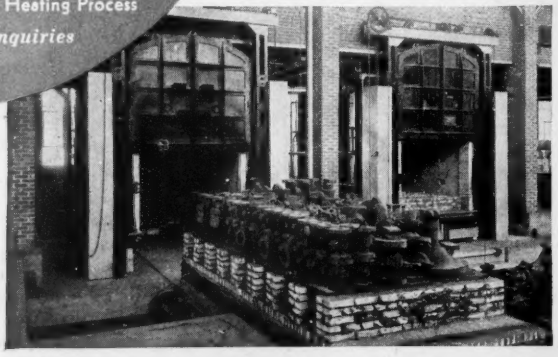
Aluminum, Magnesium
and other non-ferrous and ferrous castings are uniformly heated in EF pits and other continuous and batch type units.



Large Alloy Castings
Charging end of a large EF oil-fired roller hearth furnace annealing large alloy castings—continuously.



Steel Castings An EF car type installation consisting of two heating chambers, a cooling chamber, car puller and cross transfer car, for annealing large steel castings.



Car Bottom Furnaces EF car type furnaces are built in any size, with single chambers, multiple chambers with cross transfer car, or with quenching means as required.

Other outstanding EF installations include furnaces for bright annealing, ferrous and non-ferrous strip, wire, tubing and other products - - - - furnaces for the production heat treatment of bolts, springs, stampings and forgings; also furnaces for aluminum, copper and brass brazing; billet heating, scale-free hardening and other processes. We solicit your inquiries.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production